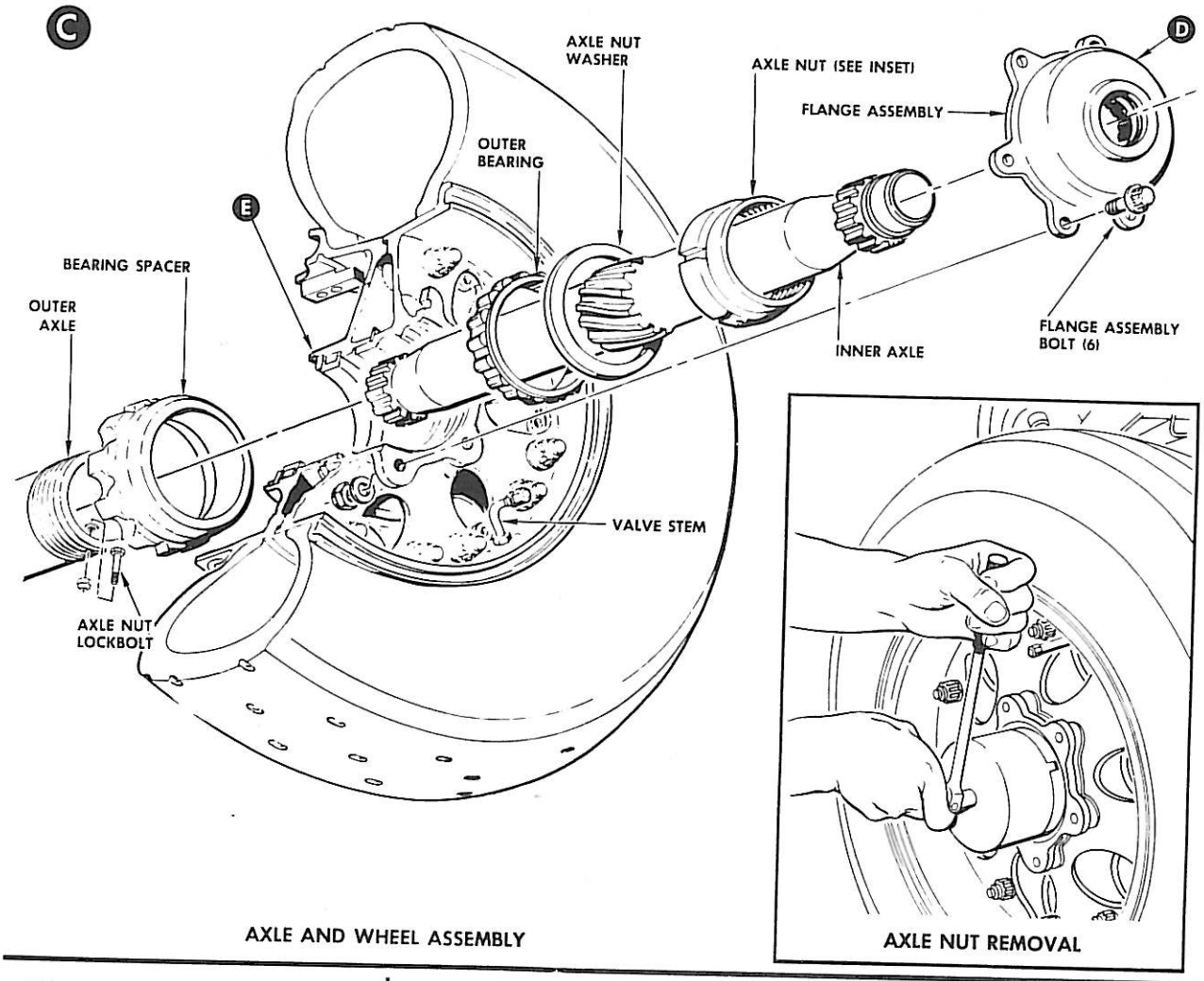
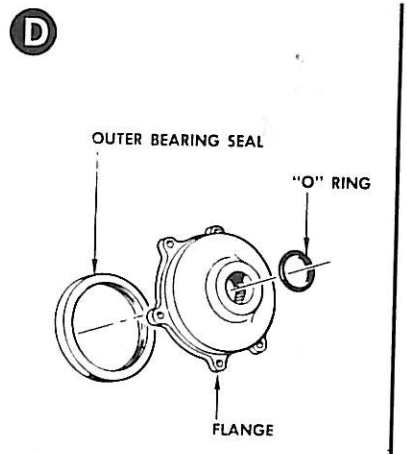


AXLE AND WHEEL ASSEMBLY

AXLE NUT REMOVAL



FLANGE ASSEMBLY

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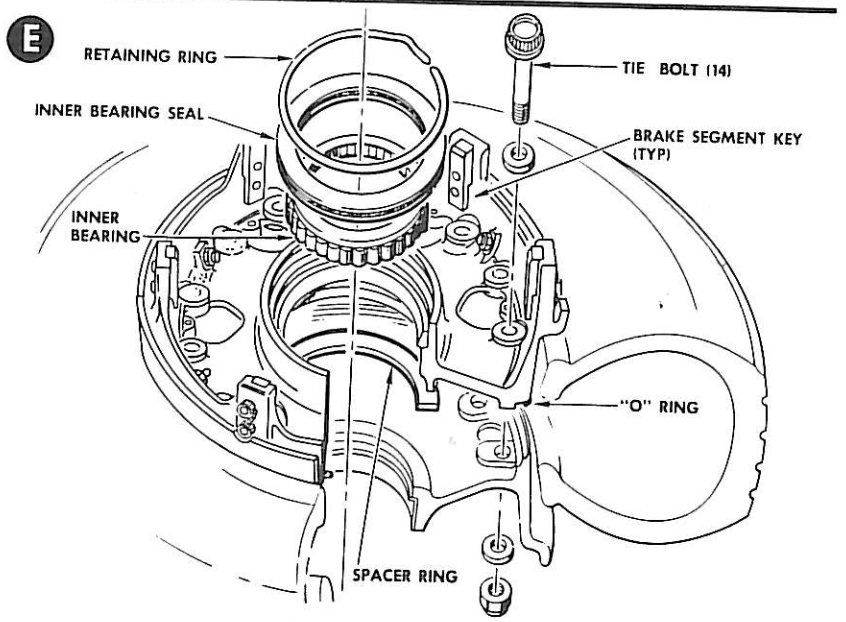


INNER WHEEL SECTION AND BEARING

	Figure Detail
(5) Deflate tire to approximately 20 psig.	
D. Remove NLG Wheel and Tire.	
(1) Remove flange assembly attachment bolts, washers, and nuts and slide flange off of splined end of inner axle.	B,C
(2) Remove two lockbolts from axle nut; remove axle nut and washer. Remove inner axle if desired.	B,C
CAUTION: IF REMOVING INNER AXLE, EXERCISE CARE TO PREVENT DAMAGING HELICAL GEAR.	
(3) Pull wheel to start outer bearing off of axle, remove bearing.	B,C
(4) Install axle thread protector and remove wheel from outer axle, being careful not to damage inner bearing and axle.	B,C
(5) Remove wire retaining ring from groove in wheel inner section; remove bearing seal and bearing.	E
NOTE: Steps D.(6) through D.(11) need be accomplished only if wheel and tire assembly is to be disassembled.	
(6) Remove valve core and deflate tire completely.	
(7) Break beads from both wheel flanges with a bead breaking device by applying progressive pressure in even increments around the tire sidewall, as close to the tire beads as possible.	E
CAUTION: DO NOT PRY BETWEEN FLANGE AND BEAD WITH SHARP TOOLS, OR THE WHEEL AND TIRE MAY BE DAMAGED.	
(8) (Deleted).	
(9) Remove fourteen tie bolts which secure wheel halves together and remove tire.	E
(10) Remove and discard wheel "O" ring seal from the wheel inner half.	E
(11) Remove spacer ring between wheel halves.	E

Figure
Detail

E. Install NLG Wheel and Tire.

NOTE: Steps E.(1) through E.(10) need be accomplished only if wheel and tire assembly must be assembled. Both NLG tires must bear the same trade name, and must be matched in size, so as not to exceed 0.75-inch difference in circumference. Tires exceeding this size difference may cause directional control difficulties.

(1) Clean and check wheel parts prior to assembly (refer to 32-1-6, Inspection/Check Landing Gear Wheels - Visual Check, and Cleaning/Painting Landing Gear Wheels).

(2) Before mounting tire, make certain that tire is free of foreign material and bead areas are clean. Remove oil, grease, or other contamination from tire with laundry soap, bar soap, or detergent solution. Rinse thoroughly with water and wipe dry with clean cheesecloth.

(3) Visually check tire, especially the bead area, for damage.

(4) Wipe wheel flange bead seat and wheel register areas with a clean cloth dampened with denatured alcohol, Specification MIL-A-6019.

(5) Coat new "O" ring seal with Dow Corning Silicone Insulating and Sealing Compound DC-4, and install seal in groove on wheel inner half. E

NOTE: Seal must be equalized around wheel, and must not be twisted.

(6) Install spacer ring with chamfered side next to wheel outer half. Minimum reusable thickness of spacer ring is 0.100 inch. Allowable variation in thickness of spacer ring is 0.003 inch. E

(7) Place tubeless tire on wheel outer half with the red balance dot at the valve stem. E

(8) Position wheel inner half in tire, with wheel spokes aligned with wheel outer half, and align the bolt holes, being careful to avoid misaligning or damaging "O" ring and spacer ring. E

Figure Detail

(9) Install wheel tie bolts as follows: E

(a) Lubricate bolt threads and bearing surfaces of nut, bolt head, and washers with antiseize compound, Specification MIL-T-5544.

(b) Compress wheel halves together tight enough to allow installation of four bolts, special washers, and nuts. Install the four bolts 90 degrees apart. E

NOTE: The special washers must be placed on bolts with countersink facing bolt head and nut.

(c) Draw tie bolts up evenly until wheel halves seat; then install remaining wheel tie bolts, special washers, and nuts. E

(d) Preliminary Torque - With tie bolts, washers and nuts lubricated per step (a), preceding, tighten tie bolt nuts in a crisscross sequence to approximately 450 inch-pounds.

(e) Final Torque - Tighten tie bolt nuts to torque value of 900 (±25) inch-pounds.

(10) Inflate tire to 100 psig and leak check. After leak check is completed, deflate tire to approximately 20 psig. Mark tire and wheel with insignia red aircraft enamel, Specification MIL-E-7729, Type 1, to determine tire slippage in service.

WARNING: TIRE MUST NOT BE INFLATED TO OPERATING PRESSURE UNTIL AFTER WHEEL IS INSTALLED ON AIRPLANE.

(11) Check that axle and wheel bearing cups are clean. Pack wheel bearings with wheel bearing grease (refer to paragraph 2.B., item (6)).

(12) Install inner bearing and bearing seal in wheel inner half; secure with wire retaining ring. E

(13) Align key ways of brake rotor segment assemblies. B

NOTE: Prior to accomplishing step (14) following, check that bearing spacer is installed on outer axle.

Figure Detail

(14) Carefully slide wheel onto axle, engaging rotor drive keys in keyways of brake rotor segment assemblies. — B,C

CAUTION: USE SPECIAL CARE NOT TO DAMAGE WHEEL INNER BEARING OR AXLE.

(15) Remove axle thread protector and install outer bearing in wheel. — B,C

(16) Lubricate threads and bearing surfaces of axle, axle nut, and washer with wheel bearing grease (refer to paragraph 2.B., item (6)). — B,C

(17) Install washer and axle nut. — B,C

(18) Rotate wheel and pretorque axle nut to 54 foot-pounds.

(19) With wheel static, back off axle nut to zero torque. Retorque axle nut to 27 foot-pounds. Tighten axle nut to nearest lockbolt hole.

(20) Install inner axle (if removed) being careful not to damage helical gear. — B,C

NOTE: To facilitate inner axle installation, remove flange assembly from opposite nose wheel.

(21) Install two axle nut lockbolts to secure axle nut to outer axle. — B,C

(22) Align splines of flange assembly with splines on inner axle and secure to wheel with bolts, washers, and nuts. — B,C,D

NOTE: Prior to installing flange assembly, check that felt grease seal is installed in assembly with chamfered edge facing inboard. Also, check that "O" ring seal is installed in groove of flange assembly.

(23) Remove wedge assembly (fork) from skid detector disengage pin and engage skid detector drive. — A

(24) Inflate tire to proper pressure (refer to Chapter 12, SERVICING).

(25) Lower wheels to ground and remove jack (refer to Chapter 7, LIFTING AND SHORING).

3. Inspection/Check NLG Wheels - Visual Check (refer to 32-1-6, Inspection/Check Landing Gear Wheels)

4. Cleaning/Painting NLG Wheels (refer to 32-1-6, Cleaning/Painting Landing Gear Wheels)

5. Removal/Installation NLG Wheel Thermal Fuse Bolts (see Figure 202)

A. Equipment Required. Necessary equipment to remove, disassemble, and install NLG wheel and tire assembly (refer to Removal/Installation NLG Wheels and Tires).

B. Materials Required. Epoxy primer, Convair Specification 03021, Type 1 (Andrew Brown Co., Los Angeles, California).

C. Remove NLG Wheel Thermal Fuse Bolt.

(1) Jack airplane as necessary to remove applicable wheel (refer to Chapter 7, LIFTING AND SHORING).

(2) Remove and disassemble NLG wheel and tire assembly (refer to Removal/Installation NLG Wheels and Tires).

(3) Locate blown or leaking thermal fuse bolt(s). Fuse bolts are located four places around wheel inner half.

(4) Remove nut and washer securing thermal fuse bolt to wheel inner half; remove fuse bolt.

D. Install NLG Wheel Thermal Fuse Bolt.

(1) Place new "O" ring seal against shoulder of replacement thermal fuse bolt and insert into hole provided in wheel inner half.

(2) Install washer and nut on thermal fuse bolt; torque nut 20 to 30 inch-pounds.

NOTE: Do not allow thermal fuse bolt to turn while torquing nut.

(3) Apply one coat of epoxy primer to head of thermal fuse bolt and adjacent area. Allow primer to dry before mounting tire.

(4) Assemble and install NLG wheel and tire assembly (refer to Removal/Installation NLG Wheels and Tires).

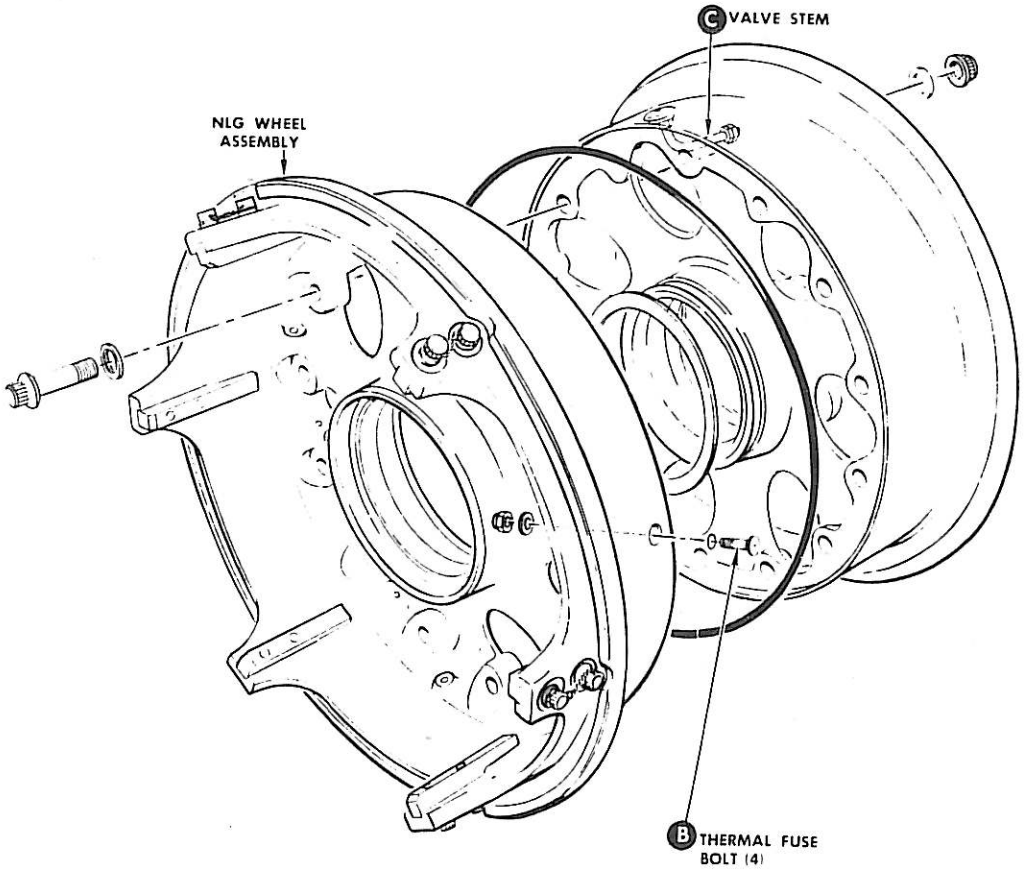
(5) Lower airplane and remove jack (refer to Chapter 7, LIFTING AND SHORING).

6. Removal/Installation NLG Wheel Valve Stem Assembly (see Figure 202)

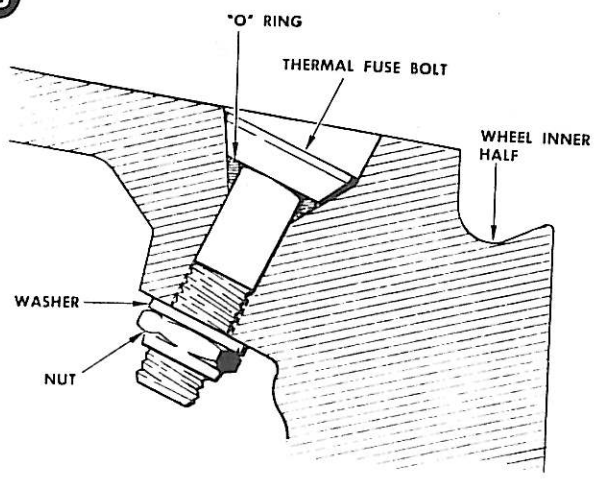
A. Equipment Required. Necessary equipment to remove, disassemble, and install NLG wheel and tire assembly (refer to Removal/Installation NLG Wheels and Tires).

B. Materials Required. Dow Corning Silicone Insulating and Sealing Compound DC-4.

A



B



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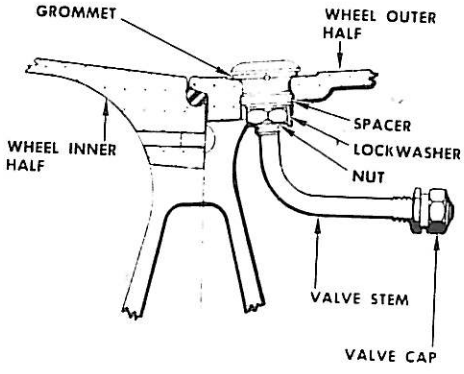
THERMAL FUSE BOLT DETAIL

C



PNEUMATIC TIRE VALVE INSTALLATION

Nose Landing Gear Wheel Fuse Bolt and Valve Stem Installation
Figure 202

C. Remove NLG Wheel Valve Stem Assembly.

(1) Jack airplane as necessary to remove applicable wheel (refer to Chapter 7, LIFTING AND SHORING).

(2) Remove and disassemble NLG wheel and tire assembly (refer to Removal/ Installation NLG Wheels and Tires).

(3) Remove nut, lockwasher, and spacer from valve stem; disassemble valve stem from wheel outer half. Discard rubber grommet.

D. Install NLG Wheel Valve Stem Assembly.

(1) Coat new rubber grommet with Dow Corning Silicone Insulating and Sealing compound DC-4, and install grommet on valve stem.

(2) Insert valve stem into hole in wheel outer half, and install spacer, lockwasher, and nut. Torque nut 30 to 50 inch-pounds.

(3) Assemble and install NLG wheel and tire assembly (refer to Removal/ Installation NLG Wheels and Tires).

(4) Retorque valve stem nut 30 to 50 inch-pounds after tire is inflated to operating pressure. Bend tang of lockwasher to locked position.

NOSE LANDING GEAR (NLG) STEERING AND TORQUE COLLAR ASSEMBLIES - MAINTENANCE PRACTICES

1. Removal/Installation NLG Torque Collar Assembly (see Figure 201)

A. Equipment Required.

(1) Airplane nose jacking equipment.

(2) Necessary equipment to remove and install NLG shock strut piston (refer to 32-3-1).

(3) Torque collar spanner wrench, Cleveland Pneumatic Tool Co., No. T-48751 or equivalent.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Jack nose of airplane as necessary to remove NLG shock strut piston (refer to Chapter 7, LIFTING AND SHORING).

(3) Open and attach warning tag to the ANTI-SKID NOSE POWER circuit breaker, on main circuit breaker panel.

C. Remove NLG Torque Collar Assembly.

(1) Remove nose wheel steering unit dust covers (refer to 32-7-1).

(2) Remove NLG shock strut piston (refer to 32-3-1).

(3) Disconnect brake line at each end of the NLG upper torque arm pivot bolt.

(4) Disconnect electrical harness to stall warning switch on NLG upper torque arm.

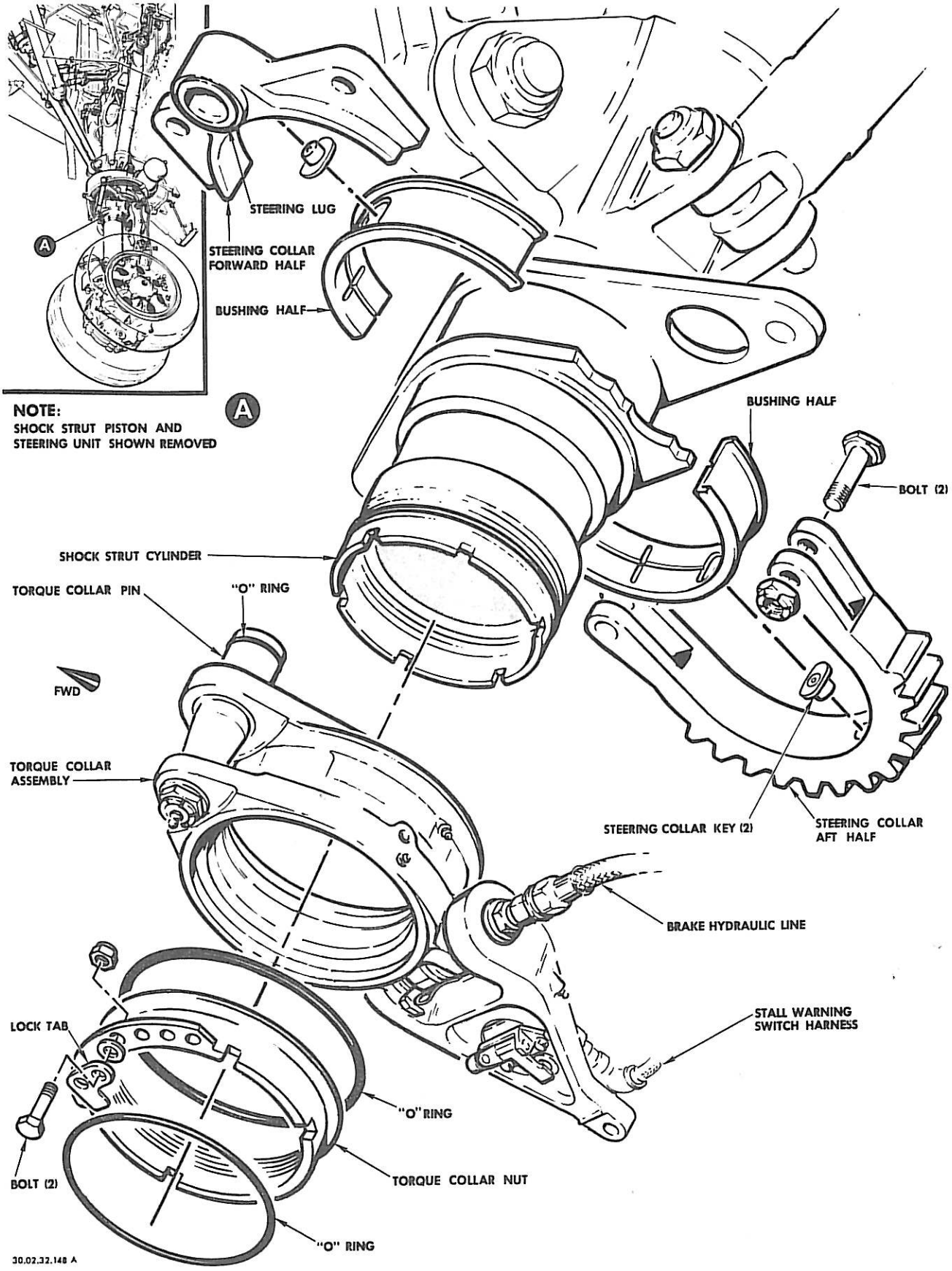
(5) Using spanner wrench, remove torque collar nut from lower end of shock strut cylinder.

(6) Slide torque collar (including upper torque arm) off lower end of the shock strut cylinder.

D. Install NLG Torque Collar Assembly.

(1) Check that "O" ring seal is installed in groove at upper end of torque collar pin.

(2) Slide torque collar over end of shock strut cylinder and insert torque collar pin into steering lug of steering collar. Hold torque collar against flange of cylinder.



Nose Landing Gear Torque and Steering Collar Installation
Figure 201

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 32-86.

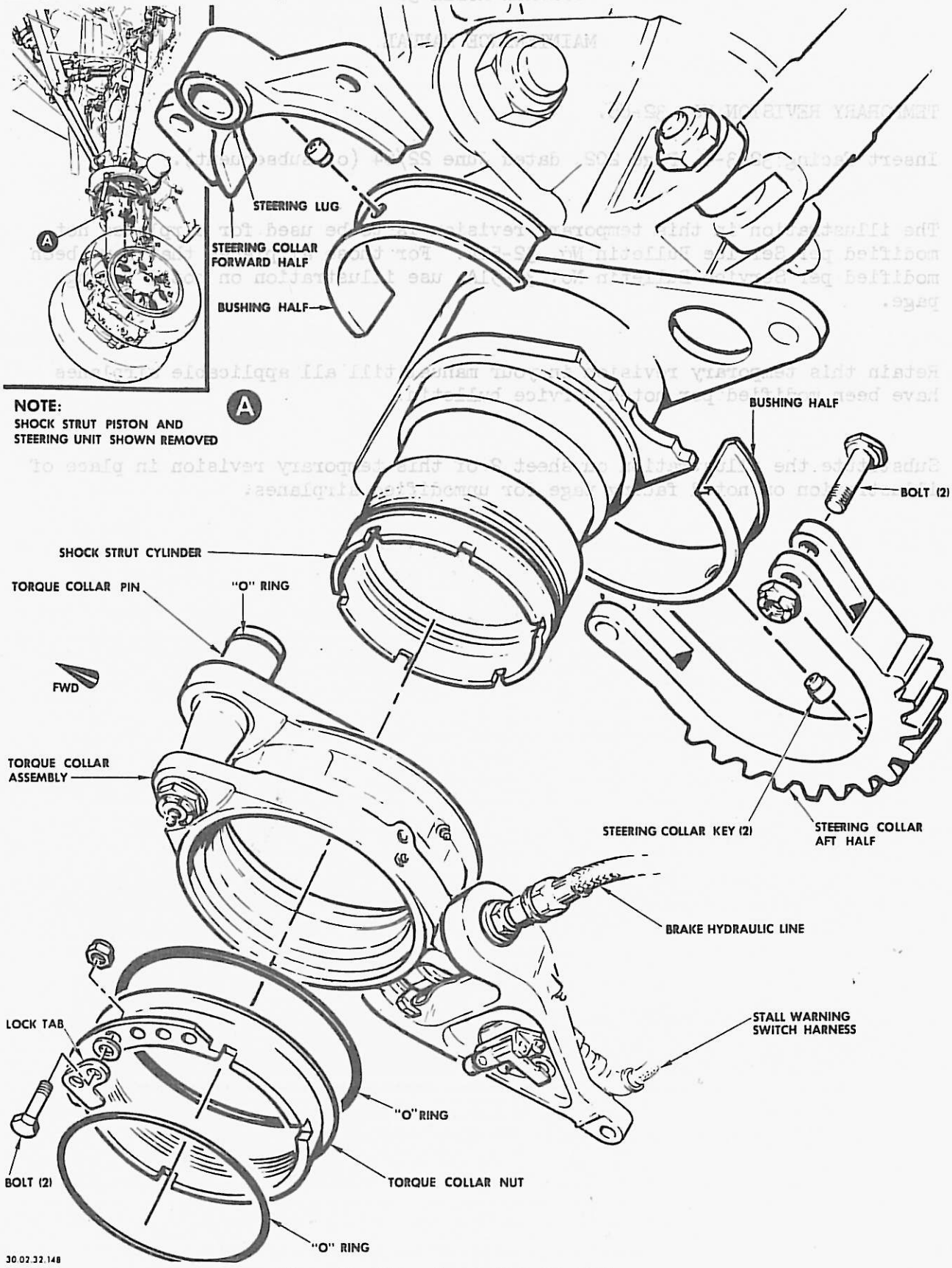
Insert facing 32-3-6, Page 202, dated June 22/64 (or subsequent).

The illustration in this temporary revision is to be used for airplanes not modified per Service Bulletin No. 32-51A. For those airplanes that have been modified per Service Bulletin No. 32-51A, use illustration on noted facing page.

Retain this temporary revision in your manual till all applicable airplanes have been modified per noted service bulletin.

Substitute the illustration on sheet 2 of this temporary revision in place of illustration on noted facing page for unmodified airplanes.

TEMPORARY REVISION NO. 32-86.



Nose Landing Gear Torque and Steering Collar Installation
Figure 201

(3) Install "O" ring in internal groove of torque collar nut.

(4) Temporarily install large diameter "O" ring below the upper flange of torque collar nut.

(5) Thread torque collar nut onto cylinder and tighten with spanner wrench. Torque nut to 20 to 40 foot-pounds; then back off to nearest alignment of slots in nut and cylinder end. Mark position of torque collar nut.

(6) Back off the torque collar nut five complete turns and install large diameter "O" ring between nut and torque collar. Return torque collar nut to position marked in step (5) preceding.

(7) Connect brake line to fittings at each end of the upper torque arm pivot bolt.

(8) Connect electrical harness to stall warning switch on NLG upper torque arm.

(9) Install NLG shock strut piston (refer to 32-3-1).

(10) Install nose wheel steering unit dust covers (refer to 32-7-1).

(11) Lower airplane and remove jack (refer to Chapter 7, LIFTING AND SHORING).

(12) Remove warning tag and close ANTI-SKID NOSE POWER circuit breaker.

(13) Lubricate NLG torque collar assembly (refer to Chapter 12, SERVICING).

(14) Bleed NLG brakes (refer to 32-8-0).

2. Removal/Installation NLG Steering Collar Assembly (see Figure 201)

A. Equipment Required.

(1) Necessary equipment to remove and install nose wheel steering unit (refer to 32-7-1).

(2) Torque collar spanner wrench, Cleveland Pneumatic Tool Co., No. T-48751 or equivalent.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Open and attach warning tag to the ANTI-SKID NOSE POWER circuit breaker, on main circuit breaker panel.

C. Remove NLG Steering Collar Assembly.

(1) Remove nose wheel steering unit (refer to 32-7-1).

(2) Remove two bolts, washers, and nuts securing lock tab to flange on torque collar nut; remove lock tab.

(3) Using spanner wrench, loosen torque collar nut until it is free of shock strut cylinder. Slide torque collar down onto piston so that torque collar pin clears steering lug of steering collar.

CAUTION: BE CAREFUL NOT TO NICK, MAR OR OTHERWISE DAMAGE FINISH ON OUTSIDE DIAMETER OF SHOCK STRUT PISTON. USE PROTECTIVE COVERING AS NECESSARY.

(4) Remove two bolts and nuts securing forward and aft halves of the steering collar assembly together; remove steering collar halves, steering collar keys, and split bushing halves from shock strut cylinder.

D. Install NLG Steering Collar Assembly.

(1) Press steering collar keys into forward and aft halves of the steering collar till bottomed.

(2) Align key holes in the split bushing halves with steering collar keys and position the split bushing halves on the steering collar halves. The stamped "X" on each bushing half shall be positioned up and adjacent to each other.

(3) Position the steering collar halves on the shock strut cylinder and install two bolts and nuts securing collar halves together.

CAUTION: STEERING COLLAR HALVES MUST BE ASSEMBLED WITH MATCHED SERIAL NUMBERS FACING UPWARD.

(4) Install NLG torque collar assembly (refer to Removal/Installation NLG Torque Collar Assembly).

(5) Align lock tab with gland nut and cylinder slots and secure to flange of torque collar nut with two bolts, washers, and nuts.

(6) Install nose wheel steering unit (refer to 32-7-1).

(7) Remove warning tag and close ANTI-SKID CONT NLG circuit breaker.

(8) Lubricate NLG steering collar assembly (refer to Chapter 12, SERVICING).

(9) Perform Adjustment/Test Nose Wheel Steering System (refer to 32-7-0).

NOSE LANDING GEAR (NLG) HYDRAULIC SYSTEM - DESCRIPTION AND OPERATION

1. General

The NLG hydraulic system distributes hydraulic power from the No. 1 hydraulic system to operate the NLG retraction mechanism, nose wheel steering, and brakes; see Figure 1. The hydraulic system consists of a NLG selector valve, actuating cylinder, door up-lock cylinder, door up-lock sequence valve, nose wheel steering unit, brake metering valve, antiskid control valve, brake adjuster, and two brake assemblies. A priority valve, relief valve, and various restrictors are included to regulate NLG retraction and extension sequence and speed of operation. A check valve is installed between the NLG "down" pressure line and the No. 1 hydraulic system return line to assist free fall of the gear during emergency extension. Refer to 32-7-0 for description and operation of the nose wheel steering unit, and 32-8-0 for additional information on the NLG brake system.

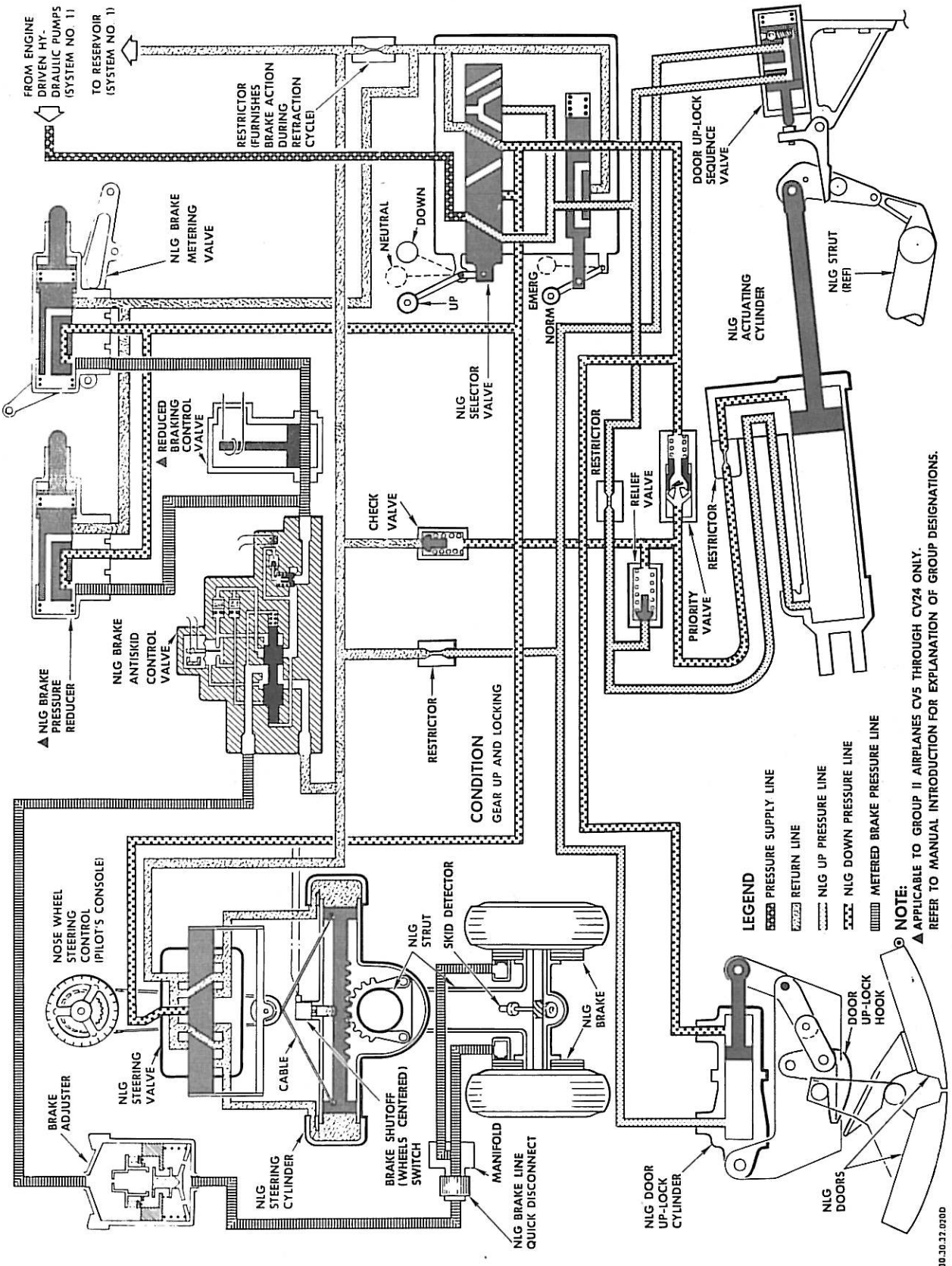
*Group II airplanes CV5 thru CV24, in addition, have a reduced braking control valve and pressure reducer valve in the brake lines. The reduced braking control valve, when energized, allows only reduced braking pressure to reach the NLG brakes. The full pressure braking system is blocked off.

2. Operation

With the landing gear down and locked and the doors closed but not locked, the following operations take place when the NLG selector valve is actuated to the UP position: hydraulic pressure is simultaneously ported to the "up" side of the NLG actuating cylinder and to the "close" side of the door up-lock sequence valve. The door up-lock sequence valve blocks pressure to the door up-lock, preventing the door up-lock from closing. Also, a "bleed off" restrictor, connected between the "close" side of the NLG door up-lock actuating cylinder and the No. 1 hydraulic system return line, assists the door up-lock sequence valve to prevent inadvertent closing of the door up-lock.

The initial movement of the NLG actuating cylinder unlocks the jury brace through a lost motion linkage and allows the NLG to retract. The NLG down-lock up-lock switch actuates and energizes the NLG inflight braking relay. The inflight braking relay, in turn, energizes the NLG antiskid control valve (valve is normally closed and must be energized before NLG brakes can be applied) to activate the NLG brake system. As the NLG retracts, a restrictor in the NLG hydraulic system return line, downstream of the selector valve, causes a back pressure to build up in the hydraulic system return line. This back pressure is routed through the NLG brake metering valve, antiskid control valve, and brake adjuster, to apply the brakes and stop wheel rotation after takeoff.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.



Nose Landing Gear Hydraulic System - Schematic
Figure 1

When the NLG reaches the fully retracted position, the jury brace locks and actuates the NLG down-lock up-lock switch and the door up-lock sequence valve. The down-lock up-lock switch, in turn, deactivates the NLG brake system and the door up-lock sequence valve ports hydraulic pressure to the "close" side of the door up-lock actuating cylinder, locking the doors closed and completing gear retraction.

With the gear up and locked and the doors closed and locked, the following operations take place when the NLG selector valve is actuated to the DOWN position: hydraulic pressure is ported to the "open" side of the door up-lock actuating cylinder and the "down" side of the gear actuating cylinder; pressure to the gear actuating cylinder is delayed by a priority valve until the gear locking mechanism on the jury brace releases. The jury brace unlocks and the NLG extends to the DOWN position. As the NLG reaches the down position, the jury brace locking mechanism again locks the jury brace to complete the gear extension cycle.

3. Nose Landing Gear (NLG) Hydraulic Selector Valve

The NLG selector valve is located on the aft bulkhead of the nose wheel well. The valve connects the pressure and return lines of the No. 1 hydraulic system to the appropriate up and down lines of the NLG; see Figure 1. The NLG selector valve also routes hydraulic pressure to the nose wheel steering unit and NLG brake system when the landing gear normal control lever is in the gear DOWN position.

The NLG selector valve, like the MLG selector valve, is actually two valves in one assembly. It contains a selector for normal gear retraction and extension, and a selector for emergency gear extension. The selector for normal operation has three positions; UP, NEUTRAL and DOWN. In the UP position, it connects the landing gear up lines to the pressure line, and the landing gear down lines to the return line. In the DOWN position these connections are reversed. In the NEUTRAL position, the up and down lines are both connected to the return line to relieve all pressure from the NLG hydraulic system.

The selector for emergency extension provides a separate valve to connect the up and down lines to the return line. This prevents a hydraulic lock which might interfere with emergency gear operation. The emergency selector valve duplicates the connections of the neutral position on the normal selector valve. The gear can be retracted after an emergency extension by releasing and returning the gear emergency release lever to its normal position and placing the landing gear normal control lever in the UP position.

4. Nose Landing Gear (NLG) Door Up-Lock Sequence Valve

The NLG door up-lock sequence valve mounts on the aft bulkhead of the nose wheel well and is actuated by the NLG locking mechanism; see Figure 1. It actuates when the NLG locking mechanism reaches the up and locked position and, in turn, ports hydraulic pressure to the door up-lock cylinder to lock

the doors in the closed position. The door up-lock sequence valve is essentially a check valve with a plunger on one end which permits the valve to be held open. Flow in the reverse direction to unlock the doors is unrestricted.

5. Nose Landing Gear (NLG) Door Up-Lock Actuating Cylinder

The NLG door up-lock actuating cylinder mounts on the forward bulkhead of the nose wheel well. It is a conventional double-acting hydraulic actuator with a stroke of 1.35 inches. The actuating cylinder operates the door up-lock which holds the NLG doors in the closed position; see Figure 1.

6. Nose Landing Gear (NLG) Actuating Cylinder

The NLG actuating cylinder is a double-acting, hydraulically operated actuator used to retract and extend the NLG; see Figure 1 and 32-3-0, Figure 1. The cylinder end of the actuating cylinder attaches to the midpoint of the NLG drag brace trunnion and the piston rod end is secured to a lost motion linkage on the NLG jury brace. The NLG actuating cylinder is fully retracted with gear extended and extended when gear is retracted; stroke is 18.78 inches.

The NLG actuating cylinder uses a floating piston to reduce peak forces applied to the NLG during gear retraction. As the gear is retracted, hydraulic pressure exerts a force on both the floating piston and the end of the piston rod, and the force acting on both the piston rod and the floating piston is transmitted to the NLG. As the actuating cylinder approaches the last 0.29 inch of travel, the floating piston contacts the end of the cylinder. From that point to the end of the gear retraction stroke, the force exerted on the floating piston is transmitted to the end of the cylinder; only the force acting on the piston rod is transmitted to the NLG.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 32-57.

Insert facing 32-4-0, Page 4, dated Jan. 25/63 (or subsequent).

The information on the noted facing page is applicable to all airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-15A, substitute the following information where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modifed per noted service bulletin.

Delete paragraph 6. and replace with the following:

6. Nose Landing Gear (NLG) Actuating Cylinder

The NLG actuating cylinder is a convential double-acting, hydraulically operated actuator used to retract and extend the NLG; see Figure 1 and 32-3-0, Figure 1. The cylinder end of the actuating cylinder attaches to the midpoint of the NLG drag brace trunnion and the piston rod end is secured to a lost motion linkage on the NLG jury brace. The NLG actuating cylinder is fully retracted with gear extended and extended when gear is retracted; stroke is 18.78 inches.

NOSE LANDING GEAR HYDRAULIC SYSTEM - TROUBLE SHOOTING

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. NOSE LANDING GEAR WILL NOT RETRACT	
A. No hydraulic pressure available.	Check the No. 1 hydraulic pressure gage on the copilot's instrument panel. If no pressure is indicated, refer to Chapter 29, HYDRAULIC POWER.
B. NLG locking mechanism will not release.	Check the NLG locking mechanism (refer to 32-3-0). If down-lock mechanism is ok, go on to next possible cause.
C. Selector valve not properly rigged or valve defective.	Check the rigging to the NLG selector valve (refer to 32-5-0). If selector valve has been rigged properly, check for hydraulic pressure at the NLG actuating cylinder. If there is no pressure, replace selector valve.
D. Relief valve stuck in open position.	Check for hydraulic fluid at the outlet port of the high pressure relief valve. If fluid flows from outlet port, replace relief valve.
E. NLG actuating cylinder defective.	If, after the previous checks, the NLG still fails to retract, replace the NLG actuating cylinder.
2. NOSE LANDING GEAR RETRACTS ONLY PARTIALLY	
A. Restrictor in return line defective.	Return NLG to the down-and-locked position and reduce hydraulic system pressure to 0 psig. Replace restrictor and perform retraction operation again. If NLG will not fully retract go on to next possible cause.
B. Priority valve defective.	Return NLG to the down-and-locked position and reduce hydraulic system pressure to 0 psig. Replace priority valve.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
3. NOSE LANDING GEAR RETRACTS BUT WILL NOT LOCK IN UP POSITION	
A. NLG locking mechanism defective.	Check the nose landing gear locking mechanism (refer to 32-3-0). Adjust as necessary.
4. NLG DOORS DO NOT LOCK IN UP POSITION	
A. Door up-lock sequence valve not operated or defective	With the NLG up-and-locked, check that the plunger of the door up-lock sequence valve has been depressed by the NLG jury brace. If the sequence valve plunger has been depressed, check for hydraulic pressure at the door up-lock cylinder. If there is no pressure replace the door up-lock sequence valve.
B. Door up-lock actuating cylinder defective.	If the door up-lock sequence valve is ok and there is pressure to the door up-lock actuating cylinder, replace cylinder.

NOSE LANDING GEAR (NLG) HYDRAULIC SYSTEM - MAINTENANCE PRACTICES

1. Adjustment/Test NLG Hydraulic System - Bleeding Procedure

A. Equipment Required.

(1) Hydraulic test unit (Skydrol 500A hydraulic fluid) capable of delivering up to 3000 psig at 16 gpm.

NOTE: The hydraulic test unit shall have a metering device to limit gear retraction or extension time to 15 seconds minimum.

(2) External source of 115/200 volt, 3-phase, 400 cps ac electrical power.

(3) Airplane jacking equipment.

(4) Guard rails for nose wheel area.

B. Preparation.

(1) Check that landing gear ground safety pins are installed.

(2) Jack airplane at wing and fuselage jack points until landing gear wheels clear the ground (refer to Chapter 7, LIFTING AND SHORING).

(3) Connect hydraulic test unit to No. 1 hydraulic system and pressurize system (refer to Chapter 29, HYDRAULIC POWER).

(4) Connect and apply external source of ac electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(5) Place guard rails around nose wheel area.

C. Bleeding Procedure.

NOTE: During NLG hydraulic system bleeding procedure, monitor airplane hydraulic reservoir fluid level and refill if necessary (refer to Chapter 12, SERVICING).

(1) Bleed NLG hydraulic system as follows:

(a) Remove NLG ground safety pin.

(b) Place landing gear normal control lever in the UP position and hold for 10 seconds.

(c) Place landing gear normal control lever in the DOWN position and hold for 10 seconds.

(d) Repeat steps (b) and (c) twenty-five times.

(e) Reinstall NLG ground safety pin.

(2) Bleed NLG steering unit as follows:

(a) Disconnect NLG torque arms.

CAUTION: DO NOT TURN NLG WITH STRUT EXTENDED AND TORQUE ARMS CONNECTED; THIS COULD DAMAGE STRUT CENTERING CAM.

(b) With landing gear normal control lever in the DOWN position, rotate nose wheel steering handwheel half-travel to left of neutral.

(c) Rotate steering handwheel half-travel to right of neutral.

(d) Return steering handwheel to neutral position.

(e) Repeat steps (b) through (d) ten times.

(f) Reconnect NLG torque arms.

(3) Bleed NLG brakes at bleed valves on brakes (refer to 32-8-0).

D. Conclusion.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING) and disconnect hydraulic test unit from airplane.

(2) Remove external source of ac power from airplane (refer to Chapter 24, ELECTRICAL POWER).

(3) Lower airplane and remove jacks (refer to Chapter 7, LIFTING AND SHORING).

TEMPORARY REVISION NO. 32-47.

Insert facing 32-4-1, Page 201, dated Sep. 17/62 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-14, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete text in step 1.C.(4) and replace with the following:

(4) Remove three mounting bolts and nuts; remove valve.

NOTE: Gain access to mounting bolt heads in the electronic compartment. Remove fittings from ports of selector valve and hold for installation on replacement selector valve; discard "O" rings.

Delete text in step 1.D.(2) and replace with the following:

(2) Deleted.

NOSE LANDING GEAR (NLG) SELECTOR VALVE - MAINTENANCE PRACTICES

1. Removal/Installation NLG Selector Valve (see Figure 201)

A. Equipment Required - None.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Open and attach warning tag to the HYD PUMP MOTOR CONT circuit breaker, on main circuit breaker panel.

(3) Check that landing gear ground safety pins are installed.

C. Remove NLG Selector Valve.

(1) Gain access to NLG selector valve on aft bulkhead of the nose wheel well.

(2) Remove bolt and nut connecting link to fork on selector valve lever.

(3) Identify and disconnect five hydraulic lines from selector valve.

(4) Remove three mounting bolts and nuts; remove valve. Retain countersunk washers and washers used on the emergency plunger of selector valve, at the lower end of vertical push tube.

NOTE: Gain access to mounting bolt heads in the electronic compartment. Remove fittings from ports of selector valve and hold for installation on replacement selector valve; discard "O" rings.

D. Install NLG Selector Valve.

(1) Install fittings in ports of replacement selector valve. Use new "O" rings for installation. ("O" rings must be soaked in Skydrol 500A hydraulic fluid prior to installation.)

(2) Install countersunk washer and washers removed in step C.(4) on emergency plunger of selector valve. The countersunk washer shall be on the bottom with countersink facing plunger radius.

(3) Place NLG selector valve in correct position on the aft bulkhead of the nose wheel well and connect lower end of vertical push tube to emergency plunger of selector valve.

NOTE: Check that "O" ring seal is installed in the lower end of the vertical push tube.

(4) Secure NLG selector valve to the aft bulkhead of nose wheel well with three mounting bolts and nuts. Install bolts through the bulkhead, from the electronic compartment. Do not tighten bolts at this time, to permit alignment of the hydraulic lines with valve.

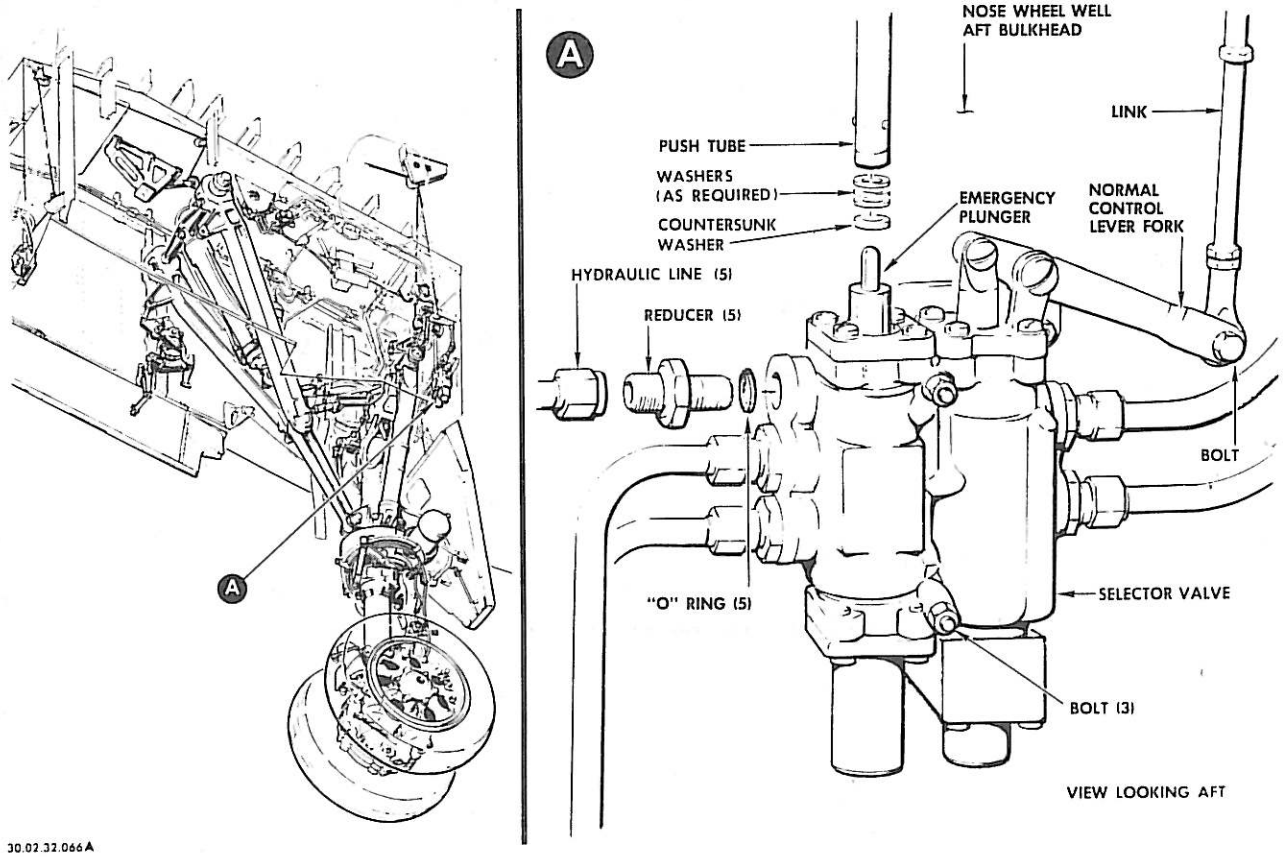
(5) Connect five hydraulic lines to selector valve, as identified in step C.(3). Do not tighten line connections at this time.

(6) Tighten mounting bolts installed in step (4) preceding; tighten five hydraulic lines connected in step (5) preceding.

(7) Remove warning tag and close HYD PUMP MOTOR CONT circuit breaker.

(8) Perform Adjustment/Test Landing Gear Normal Controls - Rigging and Adjustment (refer to 32-5-0) and Adjustment/Test Landing Gear Emergency Controls - Rigging and Adjustment (refer to 32-6-0). Check installation for leaks.

NOTE: If only the NLG selector valve has been replaced and no other rigging or adjustment has been changed, adjustment can be accomplished per 32-5-0, steps 1.B.(5), 1.C.(5), 1.C.(8), 1.C.(11) thru 1.C.(13), and 32-6-0, steps 1.C.(2) and 1.C.(3). Operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.D.(5) thru 2.D.(5)(d) 9), 2.D.(6)(b) thru 2.D.(6)(c) 5), 2.G.(1) thru 2.G.(12) (excluding MLG checks), and 2.I.(1) thru 2.I.(5).



Nose Landing Gear Selector Valve Installation
Figure 201

TEMPORARY REVISION NO. 32-48.

Insert facing 32-4-1, Page 202, dated Sep. 17/62 (or subsequent).

The illustration on the noted facing page is to be used for all applicable airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-14, delete the following parts where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

In Detail A, delete countersunk washer and washers (as required) at the emergency plunger of NLG selector valve.

NOSE LANDING GEAR (NLG) DOOR UP-LOCK SEQUENCE VALVE - MAINTENANCE PRACTICES

1. Removal/Installation NLG Door Up-Lock Sequence Valve (see Figure 201)

   A. Equipment Required - None.

   B. Preparation.

      (1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

      (2) Open and attach warning tag to the HYD PUMP MOTOR CONT circuit breaker, on main circuit breaker panel.

      (3) Check that landing gear ground safety pins are installed.

   C. Remove NLG Door Up-Lock Sequence Valve.

      (1) Gain access to NLG door up-lock sequence valve, on aft bulkhead of the nose wheel well.

      (2) Identify and disconnect two hydraulic lines from door up-lock sequence valve.

      (3) Remove three mounting bolts, washers, and nuts and remove sequence valve from mounting bracket.

         NOTE: Remove fittings from ports of sequence valve and hold for installation on replacement valve; discard "O" rings.

   D. Install NLG Door Up-Lock Sequence Valve.

      (1) Install fittings in ports of replacement sequence valve. Use new "O" rings for installation. ("O" rings must be soaked in Skydrol 500A hydraulic fluid prior to installation.)

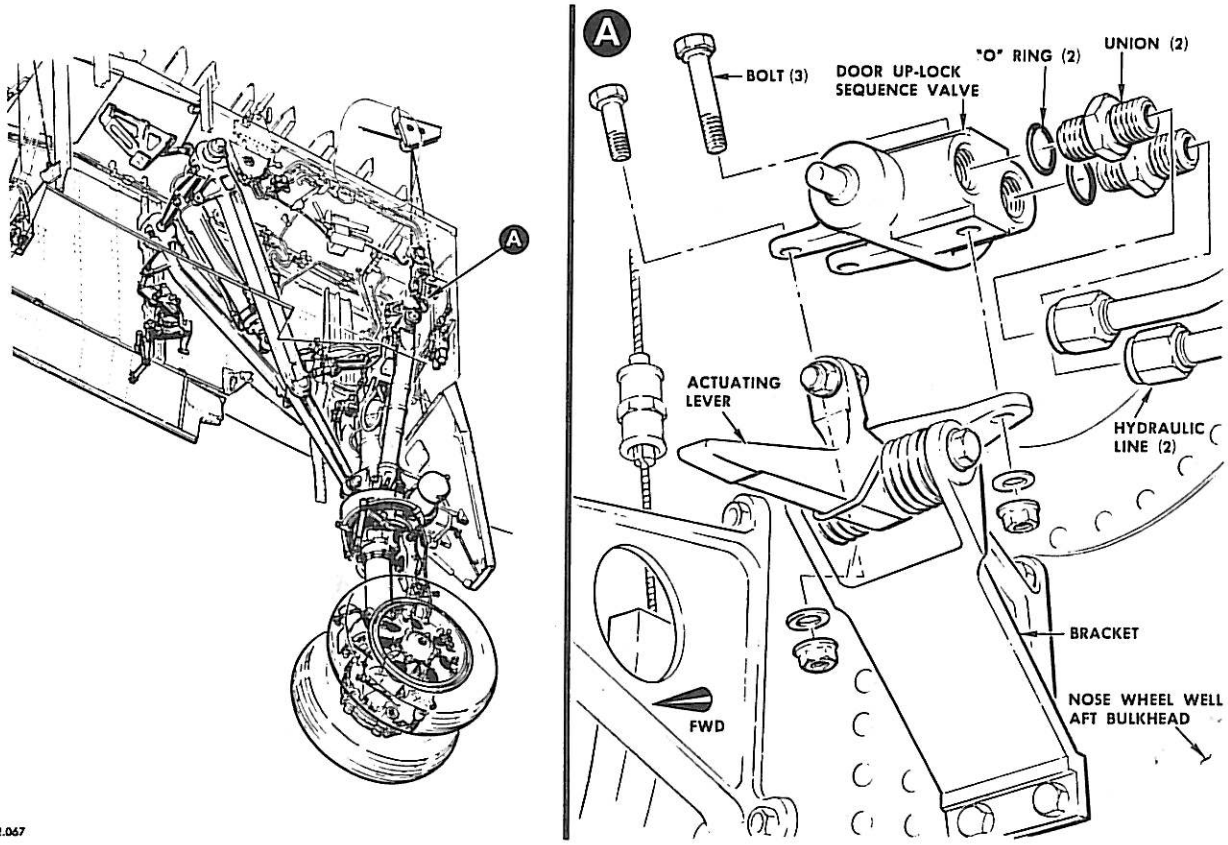
      (2) Install door up-lock sequence valve on mounting bracket with three bolts, washers, and nuts.

      (3) Connect two hydraulic lines to sequence valve, as identified in step C.(2).

      (4) Remove warning tag and close HYD PUMP MOTOR CONT circuit breaker.

      (5) Adjust door up-lock sequence valve plunger travel (refer to 32-3-0, steps 2.C.(1), 2.C.(4), 2.C.(5), and 2.D.(11). Reconnect fairing links and emergency brake vent line disconnected in step 2.C.(4) following adjustment.

      (6) Deleted.



Nose Landing Gear Door Up-Lock Sequence Valve Installation
Figure 201

(7) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0), and check sequence valve for hydraulic leaks.

NOTE: If only the NLG door up-lock sequence valve has been replaced and no other rigging or adjustment has been changed, operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.E.(2) thru 2.E.(5) (five cycles minimum), 2.I.(1), and 2.I.(3) thru 2.I.(5).

NOSE LANDING GEAR (NLG) DOOR UP-LOCK ACTUATING CYLINDER - MAINTENANCE PRACTICES

1. Removal/Installation NLG Door Up-Lock Actuating Cylinder (see Figure 201)

A. Equipment Required - None.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Open and attach warning tag to the HYD PUMP MOTOR CONT circuit breaker, on main circuit breaker panel.

(3) Check that landing gear ground safety pins are installed.

(4) Release NLG door ground access latches and open NLG doors (refer to 32-14-0).

WARNING: WHEN OPERATING LATCH LEVERS, HOLD DOORS AND LOWER THEM SLOWLY TO PREVENT POSSIBLE INJURY TO PERSONNEL.

C. Remove NLG Door Up-Lock Actuating Cylinder.

(1) Identify and disconnect two hydraulic lines from the door up-lock actuating cylinder.

(2) Remove bolt attaching the cylinder end of actuating cylinder to the door up-lock housing.

(3) Remove bolt attaching the rod end of actuating cylinder to the hook actuating lever; remove actuating cylinder.

NOTE: Remove fittings from ports of actuating cylinder and hold for installation on replacement actuating cylinder; discard "O" rings.

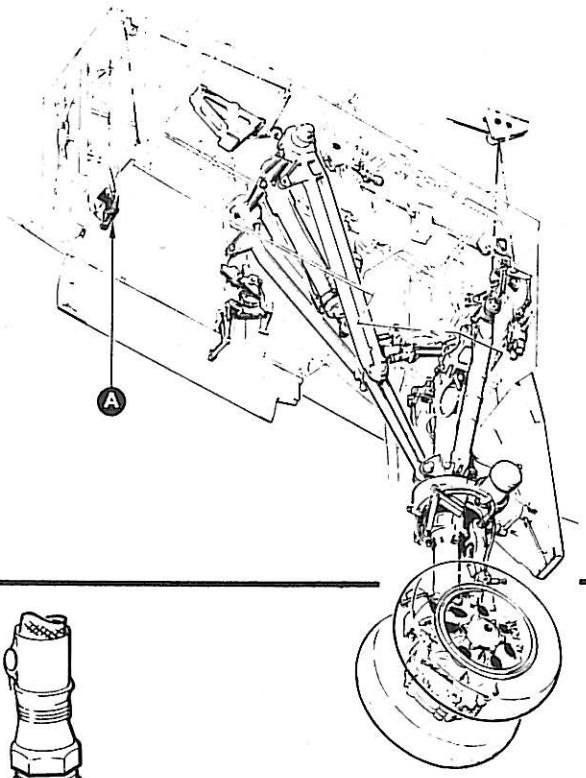
D. Install NLG Door Up-Lock Actuating Cylinder.

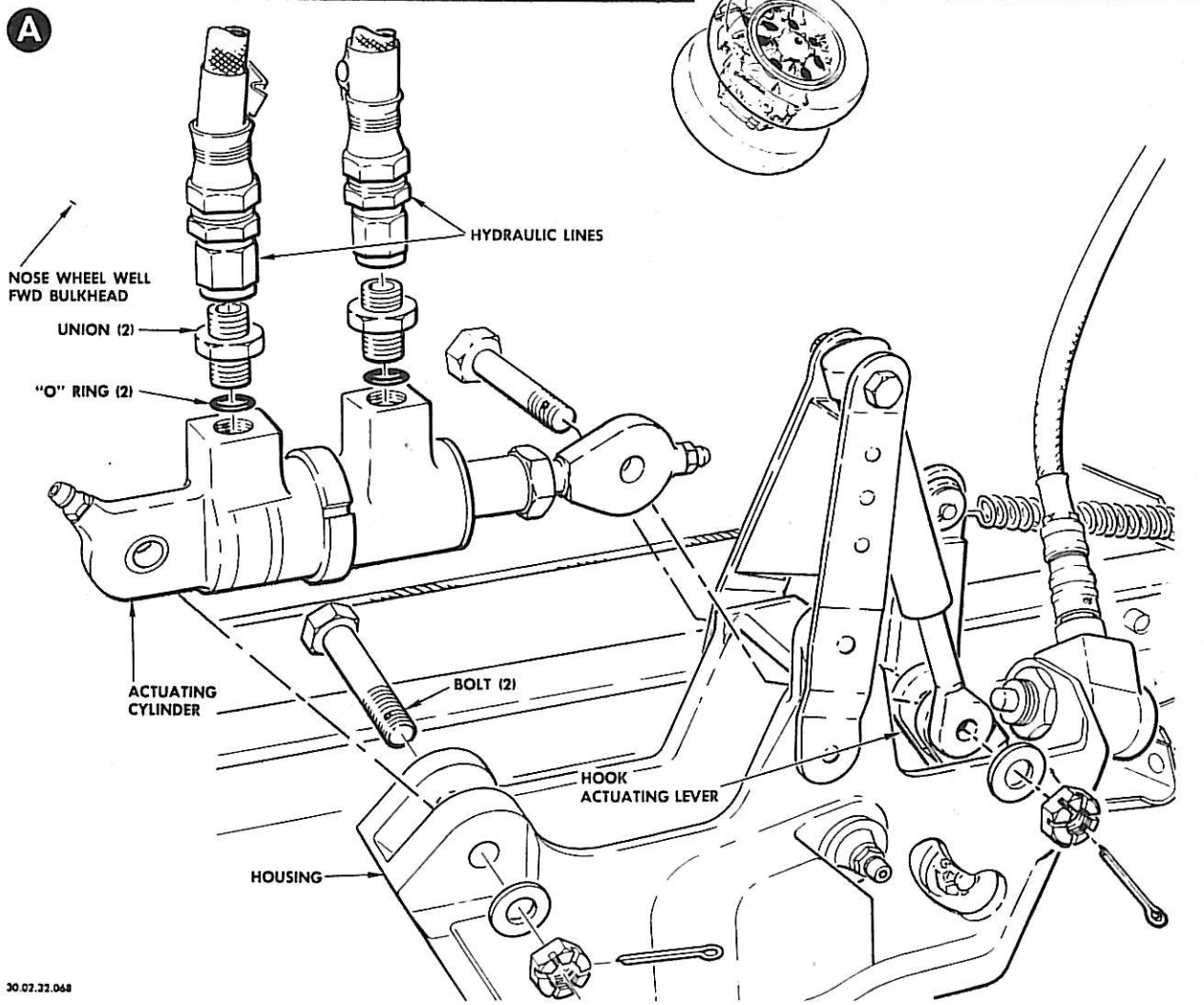
(1) Install fittings in ports of replacement actuating cylinder. Use new "O" rings for installation. ("O" rings must be soaked in Skydrol 500A hydraulic fluid prior to installation.)

(2) Place actuating cylinder in door up-lock housing and connect cylinder end to housing with bolt. Install bolt from forward side of housing; torque finger-tight and secure nut with cotter pin.

(3) Connect rod end of actuating cylinder to the hook actuating lever with bolt. Insert bolt from the forward side of the assembly; torque finger-tight and secure nut with cotter pin.

(4) Connect two hydraulic lines to actuating cylinder, as identified in step C.(1).





Nose Landing Gear Door Up-Lock Actuating Cylinder Installation
Figure 201

(5) Remove warning tag and close HYD PUMP MOTOR CONT circuit breaker.

(6) Adjust NLG door up-lock actuating cylinder (refer to 32-3-0, steps 2.C.(5), and 2.D.(13) thru 2.D.(13)(c)).

(7) Deleted.

(8) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0), and check actuating cylinder for hydraulic leaks.

NOTE: If only the NLG door up-lock actuating cylinder has been replaced and no other rigging or adjustment has been changed, operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.E.(2) thru 2.E.(5) (five cycles minimum), 2.I.(1), and 2.I.(3) thru 2.I.(5).

NOSE LANDING GEAR (NLG) ACTUATING CYLINDER - MAINTENANCE PRACTICES

1. Removal/Installation NLG Actuating Cylinder (see Figure 201)

A. Equipment Required - None.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Open and attach warning tag to the HYD PUMP MOTOR CONT circuit breaker, on main circuit breaker panel.

(3) Check that landing gear ground safety pins are installed.

(4) Release NLG door ground access latches and open NLG doors (refer to 32-14-0).

WARNING: WHEN OPERATING LATCH LEVERS, HOLD DOORS AND LOWER THEM SLOWLY TO PREVENT POSSIBLE INJURY TO PERSONNEL.

C. Remove NLG Actuating Cylinder.

(1) Identify and disconnect two hydraulic lines from actuating cylinder.

(2) Remove bolt, washer, and nut securing rod end of actuator to horn on jury brace.

(3) Remove nut, washers, and bolt connecting actuating cylinder to midpoint of drag brace trunnion; remove actuating cylinder.

NOTE: Remove fittings from ports of actuating cylinder and hold for installation on replacement cylinder; discard "O" rings.

D. Install NLG Actuating Cylinder.

(1) Install fittings in ports of replacement cylinder. Use new "O" rings. ("O" rings must be soaked in Skydrol 500A hydraulic fluid prior to installation.)

(2) Connect cylinder end of actuating cylinder to midpoint of drag brace trunnion and install bolt, washer, and nut.

NOTE: Install Teflon washer between upper side of drag brace trunnion and cylinder.

(3) Connect rod end of actuator to horn on jury brace and secure with bolt, washer, and nut.

(4) Connect two hydraulic lines to ports on actuating cylinder, as identified in step C.(1).

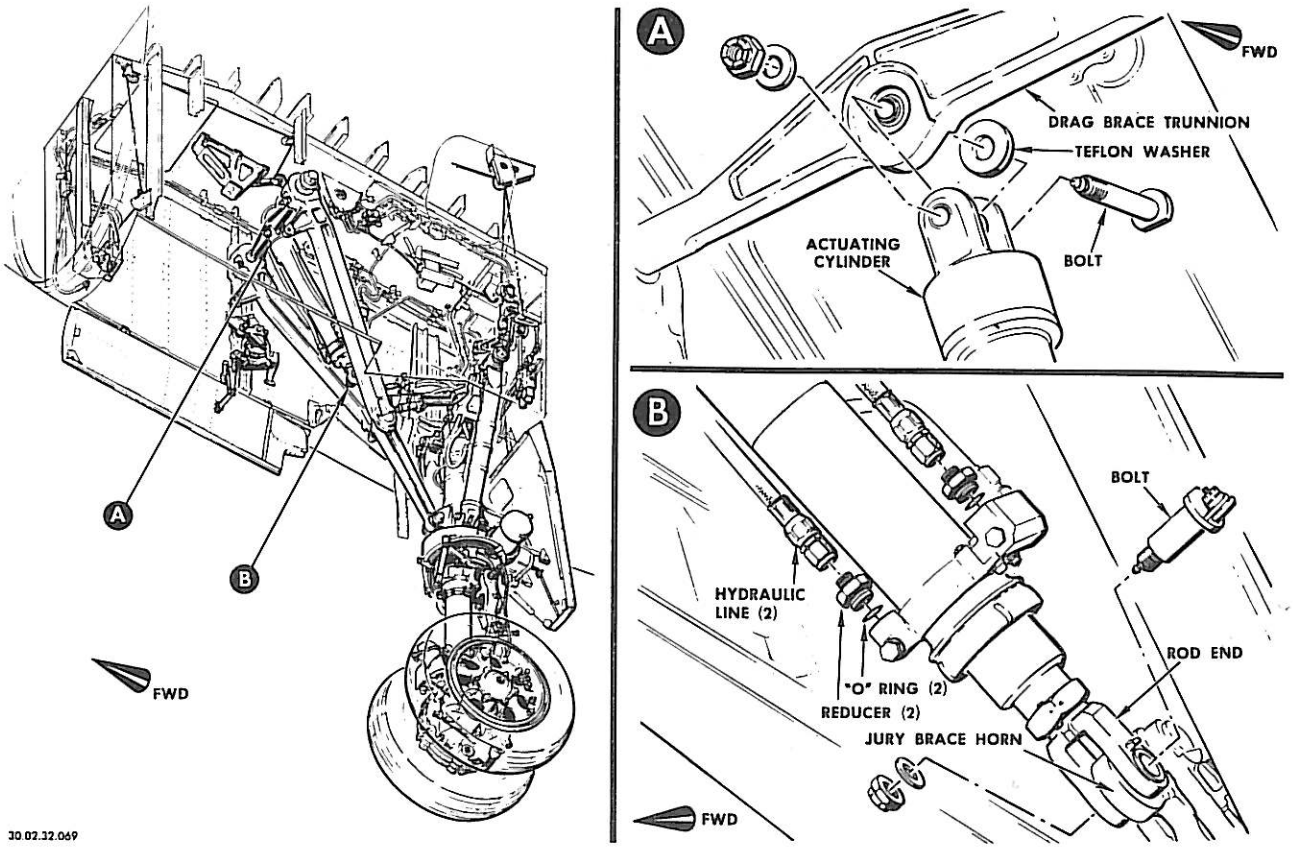
(5) Remove warning tag and close HYD PUMP MOTOR CONT circuit breaker.

(6) Adjust actuating cylinder overtravel (refer to 32-3-0, step 2.C.(1), 2.C.(3), 2.C.(5), 2.D.(7), 2.D.(10), and 2.D.(14)(h) thru 2.D.(14)(j).

(7) Deleted.

(8) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0), and check actuating cylinder for hydraulic leaks.

NOTE: If only the NLG actuating cylinder has been replaced and no other rigging or adjustment has been changed, operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.E.(2) thru 2.E.(5) (five cycles minimum), 2.I.(1), and 2.I.(3) thru 2.I.(5).



Nose Landing Gear Actuating Cylinder Installation
Figure 201

NOSE LANDING GEAR PRIORITY VALVE - MAINTENANCE PRACTICES

1. Removal/Installation NLG Priority Valve (see Figure 201)

A. Equipment Required - None.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Open and attach warning tag to the HYD PUMP MOTOR CONT circuit breaker on main circuit breaker panel.

(3) Check that landing gear ground safety pins are installed.

(4) Release NLG door ground access latches and open NLG doors (refer to 32-14-0).

WARNING: WHEN OPERATING LATCH LEVERS, HOLD DOORS AND LOWER THEM SLOWLY TO PREVENT POSSIBLE INJURY TO PERSONNEL.

C. Remove NLG Priority Valve.

(1) Identify and disconnect two hydraulic lines (one at each end) from priority valve.

(2) Remove screws from two clamps which secure the priority valve to the nose wheel well roof; remove valve.

NOTE: Remove fittings from ends of valve and hold for installation on replacement valve; discard "O" rings.

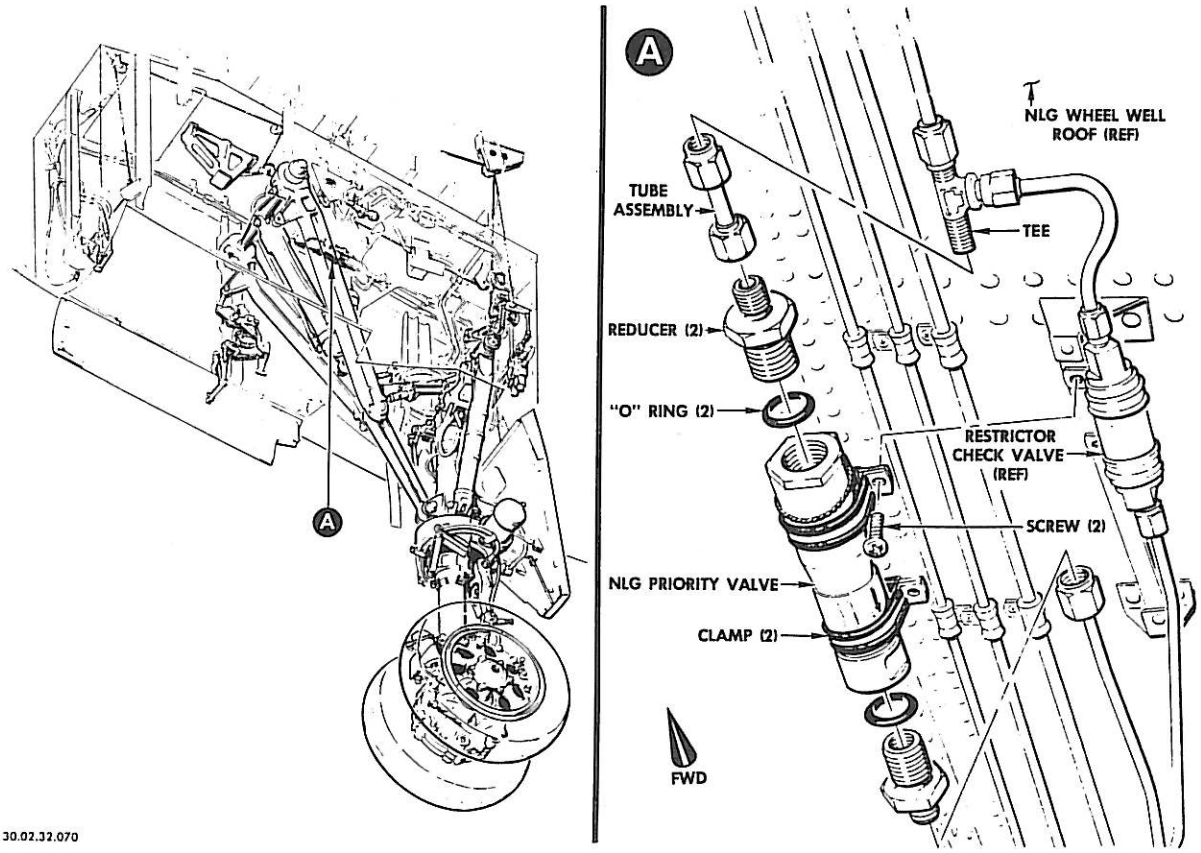
D. Install NLG Priority Valve.

(1) Install fittings in ends of replacement valve. Use new "O" rings for installation ("O" rings must be soaked in Skydrol 500A hydraulic fluid prior to installation).

(2) Position priority valve on roof of wheel well (FREE FLOW arrow pointing aft) and secure with two mounting clamps.

(3) Connect two hydraulic lines to priority valve, as identified in step C.(1).

(4) Remove warning tag and close HYD PUMP MOTOR CONT circuit breaker.



Nose Landing Gear Priority Valve Installation
Figure 201

(5) Deleted.

(6) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0), and check priority valve for hydraulic leaks.

NOTE: If only the NLG priority valve has been replaced and no other rigging or adjustment has been changed, operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.E.(2) thru 2.E.(5) (five cycles minimum), 2.I.(1), and 2.I.(3) thru 2.I.(5).

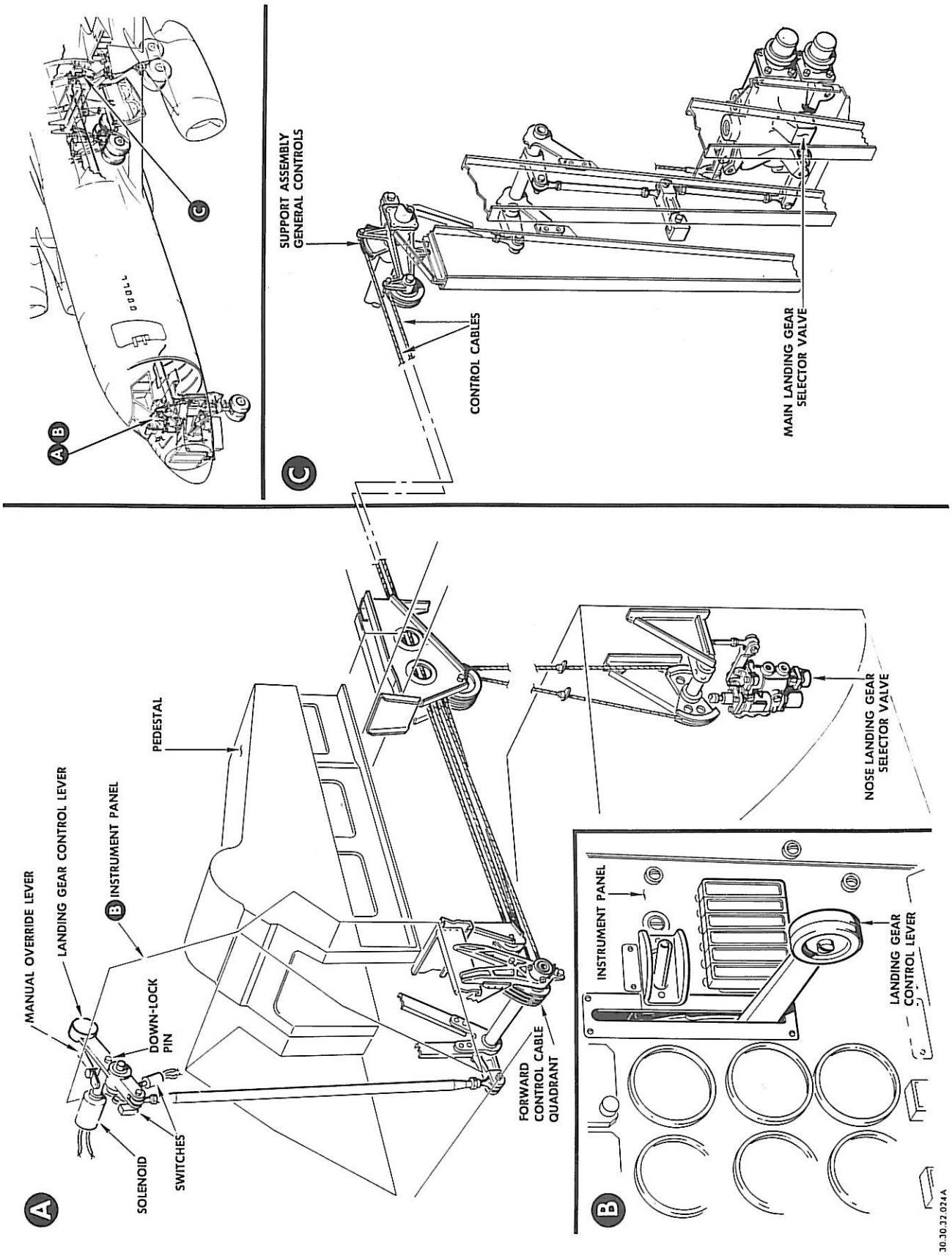
LANDING GEAR NORMAL CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General

The landing gear normal control system controls normal retraction and extension of the landing gear. The system consists of a control lever connected through push-pull rods, cable quadrants and bell cranks to control cables which actuate the nose and main landing gear hydraulic selector valves; see Figure 1.

The landing gear control lever assembly is located on the pilots' center instrument panel and has three positions: GEAR DOWN, NEUTRAL, and GEAR UP. A spring-loaded lock holds the lever in position selected. The lever must be pulled out approximately 1/8 inch before it can be moved up or down. When the control lever is in the GEAR DOWN or GEAR UP position, the landing gear hydraulic systems are pressurized to extend or retract the gear. After takeoff, the control lever is placed in the NEUTRAL position to remove pressure from the landing gear hydraulic systems during flight. A lock solenoid, with manual override, locks the control lever in the GEAR DOWN position when the airplane is groundborne. See 32-0, Figure 2 for control lever and manual override location on pilots' center instrument panel.

The landing gear control lever assembly also contains four microswitches: a lever down position switch, a lever up position switch, lever down-and-retracted switch, and a lock solenoid switch. However, only the lever down-and-retracted switch and the lock solenoid switch are used. The lever up position switch (not used) is deactuated when the control lever is approximately five degrees above the NEUTRAL position moving toward the GEAR UP position. The lever down position switch (not used) is deactuated when the control lever is approximately five degrees below the NEUTRAL position moving toward the GEAR DOWN position. The lever down-and-retracted switch is actuated when the control lever is in the GEAR DOWN position. The switch deactuates when control lever is pulled out and completes a circuit to illuminate the GEAR UNSAFE light in the flight compartment, provided the landing gear is down and locked. The lock solenoid switch is actuated when the plunger of the lock solenoid has the control lever locked in the GEAR DOWN position. If the lock solenoid does not have the control lever locked in the GEAR DOWN position and the airplane is groundborne, the lock solenoid switch deactuates and completes a circuit to sound the warning horn. See 32-12-0, Figure 1 for electrical connections to the control lever microswitches.



Landing Gear Normal Control System
Figure 1

1. Adjustment/Test Landing Gear Normal Controls - Rigging and Adjustment (see Figure 201)

A. Equipment Required.

(1) Two cable tensiometers calibrated to measure 3/32 x 7 x 7 cable.

(2) One 3/32-inch diameter indexing pin 2.0 inches long.

(3) One 3/16-inch diameter indexing pin 7.5 inches long.

(4) Two 3/16-inch diameter indexing pins 3.0 inches long.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Ascertain that landing gear ground safety pins are installed.

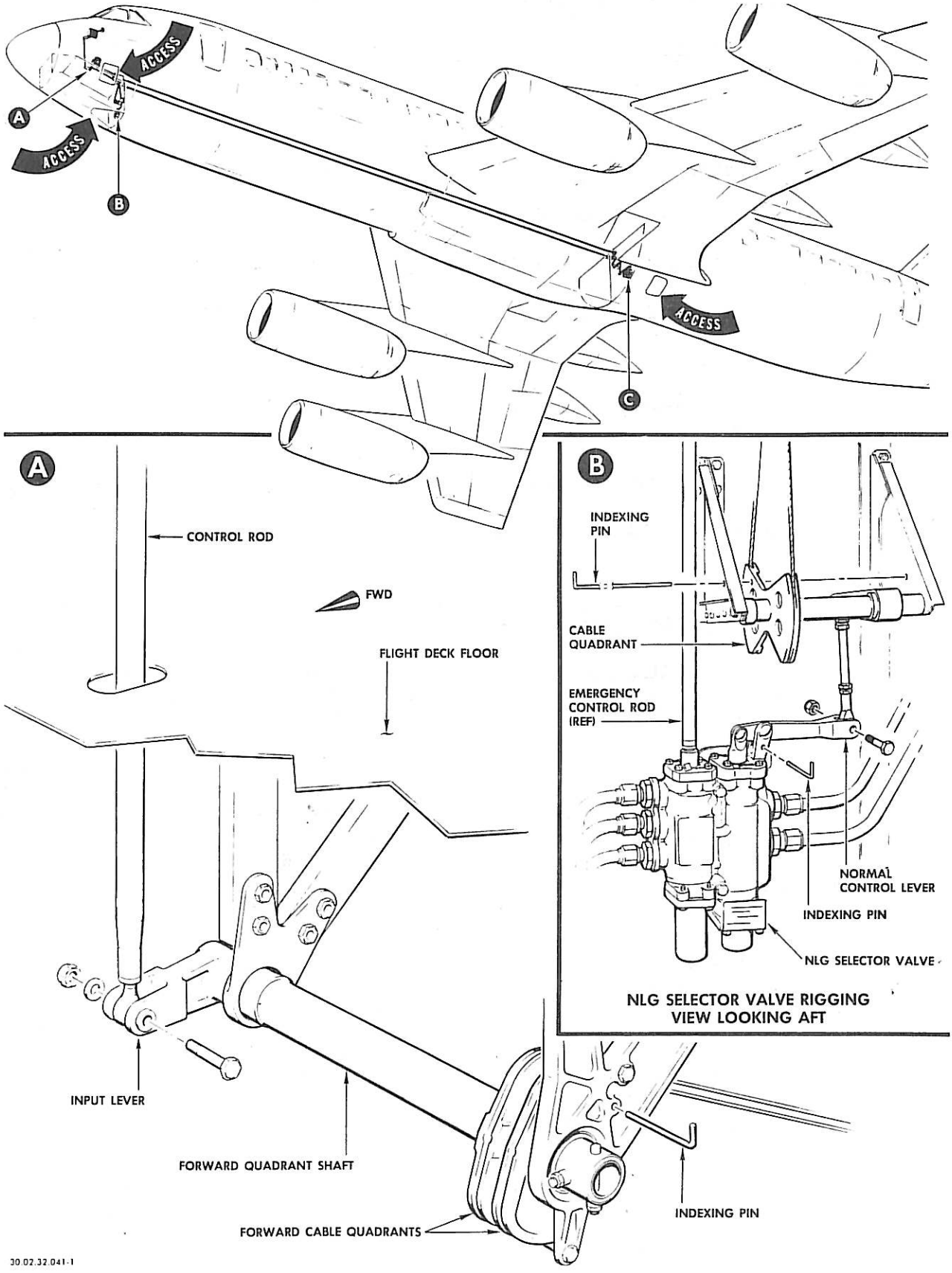
(3) Check that all landing gear control levers and pulleys are free to rotate.

(4) Check that cable guards are correctly installed and that cables are in pulley grooves.

(5) Remove landing gear override WARN HORN fuse in the dc power and emergency bus box below main circuit breaker panel and attach warning tag.

C. Rigging Procedure.

	Figure Detail
(1) Disconnect the landing gear normal control rods at the NLG and MLG selector valves.	B,C
(2) Disconnect control rod from the input lever on forward cable quadrant shaft, below flight compartment floor.	A
(3) Install 3/16-inch diameter indexing pin to rig forward cable quadrants.	A
(4) Install 3/16-inch diameter indexing pin to rig aft cable quadrant on the general controls support in the hydraulic compartment.	C
(5) Install 3/16-inch diameter indexing pin to rig cable quadrant above the NLG selector valve.	B


ACCESS
ACCESS
ACCESS
A
B
C
A
CONTROL ROD
FWD
FLIGHT DECK FLOOR
INPUT LEVER
FORWARD QUADRANT SHAFT
FORWARD CABLE QUADRANTS
INDEXING PIN
B
INDEXING PIN
CABLE QUADRANT
EMERGENCY CONTROL ROD (REF)
NORMAL CONTROL LEVER
INDEXING PIN
NLG SELECTOR VALVE
NLG SELECTOR VALVE RIGGING
VIEW LOOKING AFT
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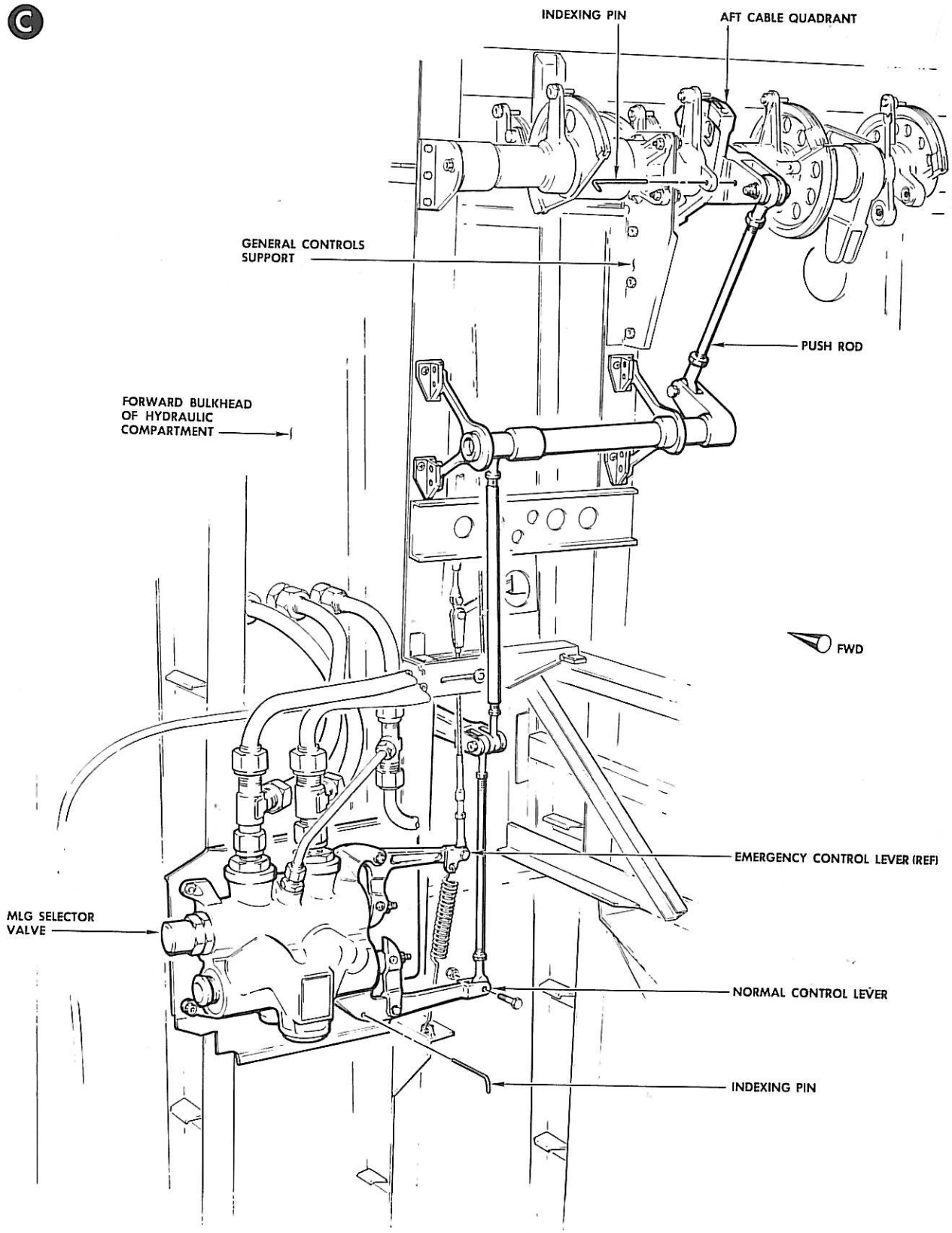

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MLG SELECTOR VALVE RIGGING—VIEW LOOKING FORWARD

Figure
Detail

(6) Adjust cable tension to 50 (±5) pounds at 70 degrees F. Increase tension 0.25 pound per degree F (0.50 pound per degree C) increase in ambient temperature; decrease tension 0.25 per degree F (0.50 pound per degree C) decrease in ambient temperature. Safety turnbuckles following adjustment.

NOTE: Check cable tension at two places along each cable. The average reading shall meet required value. Turnbuckles are located at fuselage sta 218, 234, 441, 460, 629, and 648.

(7) Adjust normal control lever rod at the MLG selector valve until 3/32-inch diameter indexing pin can be inserted through indexing holes in MLG selector valve. Connect control rod to normal control lever with bolt and nut. C

(8) Adjust normal control lever rod connecting NLG selector valve to cable quadrant until 3/32-inch diameter indexing pin can be inserted through indexing holes in NLG selecter valve. Connect rod to normal control lever with bolt and nut. B

(9) Place landing gear control lever in NEUTRAL position.

NOTE: The manual override lever at the base of the landing gear control lever must be actuated to permit moving the control lever from the DOWN position.

(10) Adjust and connect landing gear control rod to input lever on forward cable quadrant shaft. A

(11) Remove all indexing pins and cable tensiometers.

(12) Place landing gear control lever in the DOWN position.

(13) Remove warning tag and install landing gear override WARN HORN fuse.

(14) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0).

LANDING GEAR CONTROL LEVER - MAINTENANCE PRACTICES

1. Removal/Installation Landing Gear Control Lever (see Figure 201)

A. General.

The landing gear control lever assembly is mounted on the forward side of the pilots' center instrument panel. Gain access to the lever assembly through the nose wheel well (interior) door.

B. Equipment Required - None.

C. Preparation.

(1) Check that the landing gear ground safety pins are installed.

(2) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(3) Open and attach warning tags to the WARN HORN, LANDING GEAR POS & WARN and LANDING GEAR HANDLE SOLENOID circuit breakers, on the main circuit breaker panel.

(4) Remove electrical power from airplane, or open all applicable circuit breakers for any electrically operated components surrounding the landing gear control lever installation. Attach warning tags.

(5) Place the landing gear control lever in the NEUTRAL position.

NOTE: The manual override lever at the base of the landing gear control lever must be actuated to permit moving the control lever from the DOWN position.

D. Remove Landing Gear Control Lever Assembly.

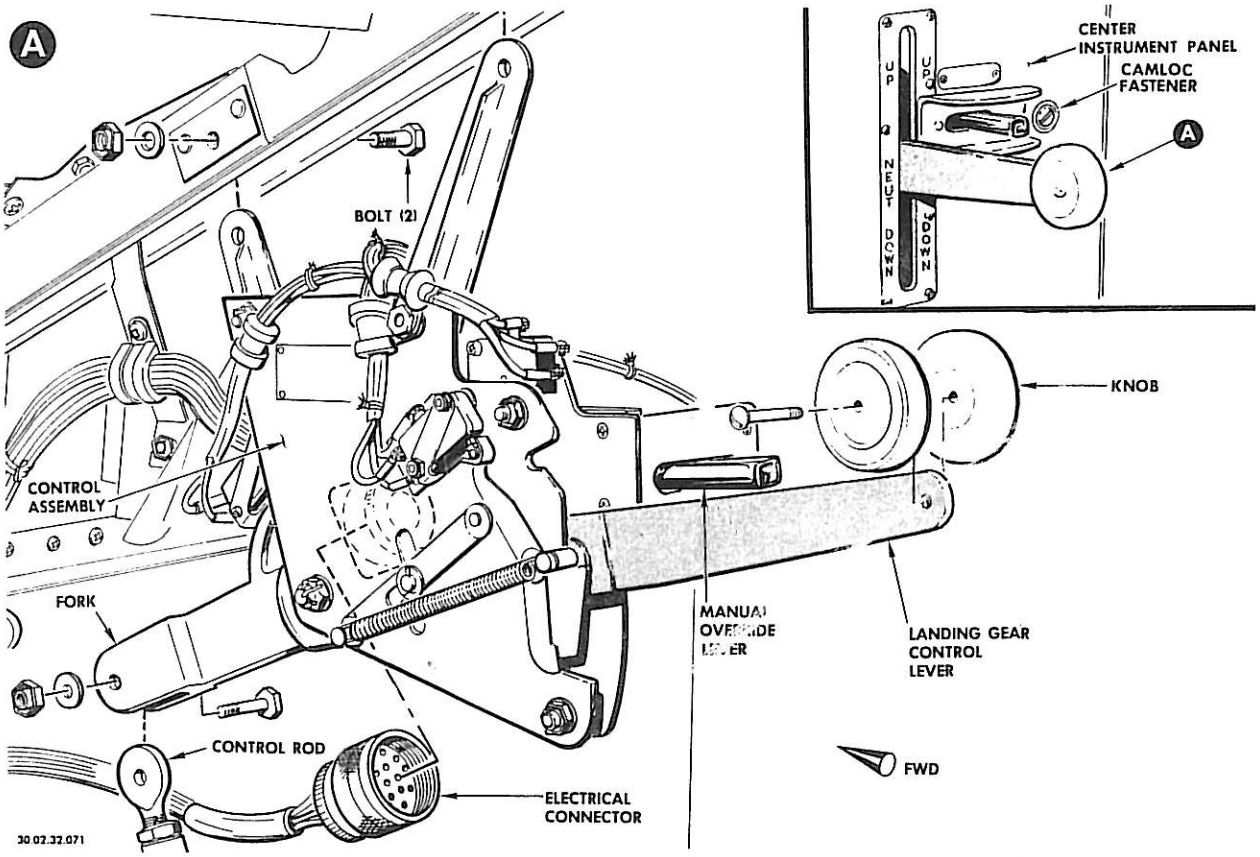
(1) Back off screw in control lever knob and remove knob.

(2) Disconnect the electrical harness connector from the control assembly.

(3) Disconnect the landing gear control rod from the fork fitting on the control assembly.

(4) Unfasten the panel fastener (adjacent to the manual override lever) on the face of the pilots' center instrument panel.

(5) Remove two bolts securing the control assembly to the instrument panel support channel; remove assembly.



Landing Gear Control Lever Installation
Figure 201

E. Install Landing Gear Control Lever Assembly.

(1) Remove control lever knob (if replacement control assembly is being installed) and insert lever through slot in pilots' center instrument panel; install control lever knob and secure with screw.

(2) Secure the control assembly to the instrument panel support channel with two bolts.

(3) Fasten the panel fastener on the face of the pilots' center instrument panel.

(4) Connect electrical harness connector to the control assembly.

(5) Place landing gear control lever in the NEUTRAL position; adjust and connect control rod to fork fitting on control assembly (refer to 32-5-0, steps 1.C.(3), 1.C.(10), and 1.C.(11) for adjustment).

(6) Place the landing gear control lever in the DOWN position.

(7) Remove warning tags and close circuit breakers opened in step C.

(8) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0).

NOTE: If only the landing gear normal control lever has been replaced and no other rigging or adjustment has been changed, operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.D.(4) thru 2.D.(5)(d) 9), 2.D.(6)(b) thru 2.D.(6)(c) 5), 2.I.(1), and 2.I.(3) thru 2.I.(5)).

LANDING GEAR FORWARD CONTROL CABLE QUADRANT - MAINTENANCE PRACTICES

1. Removal/Installation Landing Gear Forward Control Cable Quadrant (see Figure 201)

A. General.

The landing gear forward control cable quadrant is located in the forward electrical equipment compartment. Gain access to the quadrant through the left and right electrical equipment tunnel access doors.

B. Equipment Required - None.

C. Preparation.

(1) Check that the landing gear ground safety pins are installed.

(2) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(3) Remove electrical power from airplane or: open and attach warning tags to the WARN HORN, LANDING GEAR POS & WARN and LANDING GEAR HANDLE SOLENOID circuit breakers on the main circuit breaker panel; open all applicable circuit breakers for any electrically operated components surrounding the forward control cable quadrant installation.

(4) Place the landing gear control lever in the NEUTRAL position.

NOTE: The manual override lever at the base of the control lever must be actuated to permit moving the control lever from the DOWN position.

D. Remove Landing Gear Forward Control Cable Quadrant.

(1) Remove two bolts and spacers (cable guards) from top and bottom side of cable quadrants on quadrant left-hand mounting bracket.

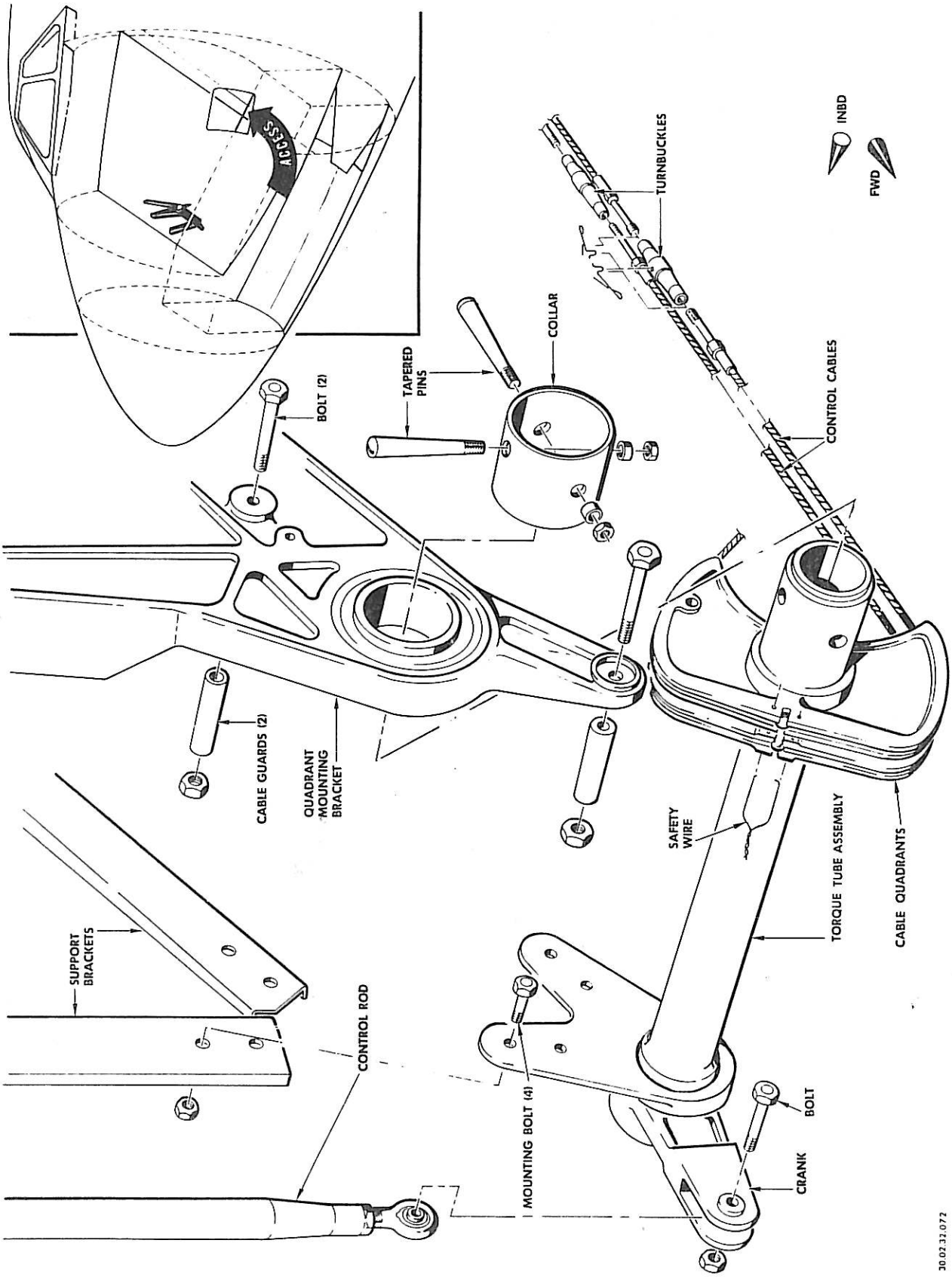
NOTE: In step (2), following, attach identification tags to the control cables prior to disconnecting them from the quadrant to ensure proper reinstallation.

(2) Release tension on the landing gear control cables by backing off on turnbuckles; remove safety wire and disconnect control cables from cable quadrants.

(3) Disconnect control rod from crank on torque tube assembly.

(4) Remove two tapered pins securing collar and cable quadrant to torque tube assembly; remove collar.

(5) Remove four bolts from torque tube right-hand support bracket and remove cable quadrant and torque tube assembly.



Landing Gear Forward Control Cable
Quadrant Installation
Figure 201

E. Install Landing Gear Forward Control Cable Quadrant.

(1) With cable quadrant installed on torque tube, slide quadrant end of assembly into mounting bracket and attach mounting bracket on right-hand end of the assembly to the airplane structure with four mounting bolts.

(2) Place collar over end of torque tube and secure collar and cable quadrant to torque tube with two tapered pins.

(3) Adjust and connect control rod to the crank on cable quadrant torque tube (refer to 32-5-0, steps 1.C.(3), and 1.C.(9) thru 1.C.(11) for adjustment).

(4) Connect the landing gear control cables to the cable quadrants and secure with safety wire. (Remove identification tags.)

(5) Install cable guards on the quadrant mounting bracket.

(6) Adjust the landing gear control cable tension (refer to 32-5-0, steps 1.C.(3) thru 1.C.(6), and 1.C.(11)).

(7) Place landing gear control lever in the DOWN position.

(8) Remove warning tags and close circuit breakers opened in step C.

(9) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0).

NOTE: If only the landing gear forward control cable quadrant has been replaced and no other rigging or adjustment has been changed, operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.E.(2) thru 2.E.(5) (five cycles minimum), 2.I.(1), and 2.I.(3) thru 2.I.(5).

NOSE LANDING GEAR (NLG) SELECTOR VALVE NORMAL CONTROL QUADRANT - MAINTENANCE PRACTICES

1. Removal/Installation NLG Selector Valve Normal Control Quadrant (see Figure 201)

A. General.

The NLG selector valve normal control quadrant is located on the aft bulkhead of the nose wheel well, above the NLG selector valve. Gain access to the quadrant through the nose wheel well fairing opening.

B. Equipment Required - None.

C. Preparation.

(1) Check that landing gear ground safety pins are installed.

(2) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(3) Open and attach warning tag to the HYD PUMP MOTOR CONT circuit breaker, on main circuit breaker panel.

D. Remove NLG Selector Valve Normal Control Quadrant.

(1) Remove bolt and nut connecting the NLG selector valve normal control rod to the lever on control quadrant.

(2) Release tension on the quadrant control cables by backing off turnbuckles in the left electrical equipment "tunnel" compartment. Turnbuckles are located at approximately fuselage sta 218 and 233.

(3) Remove cotter pins securing control cables to the quadrant; disconnect cables.

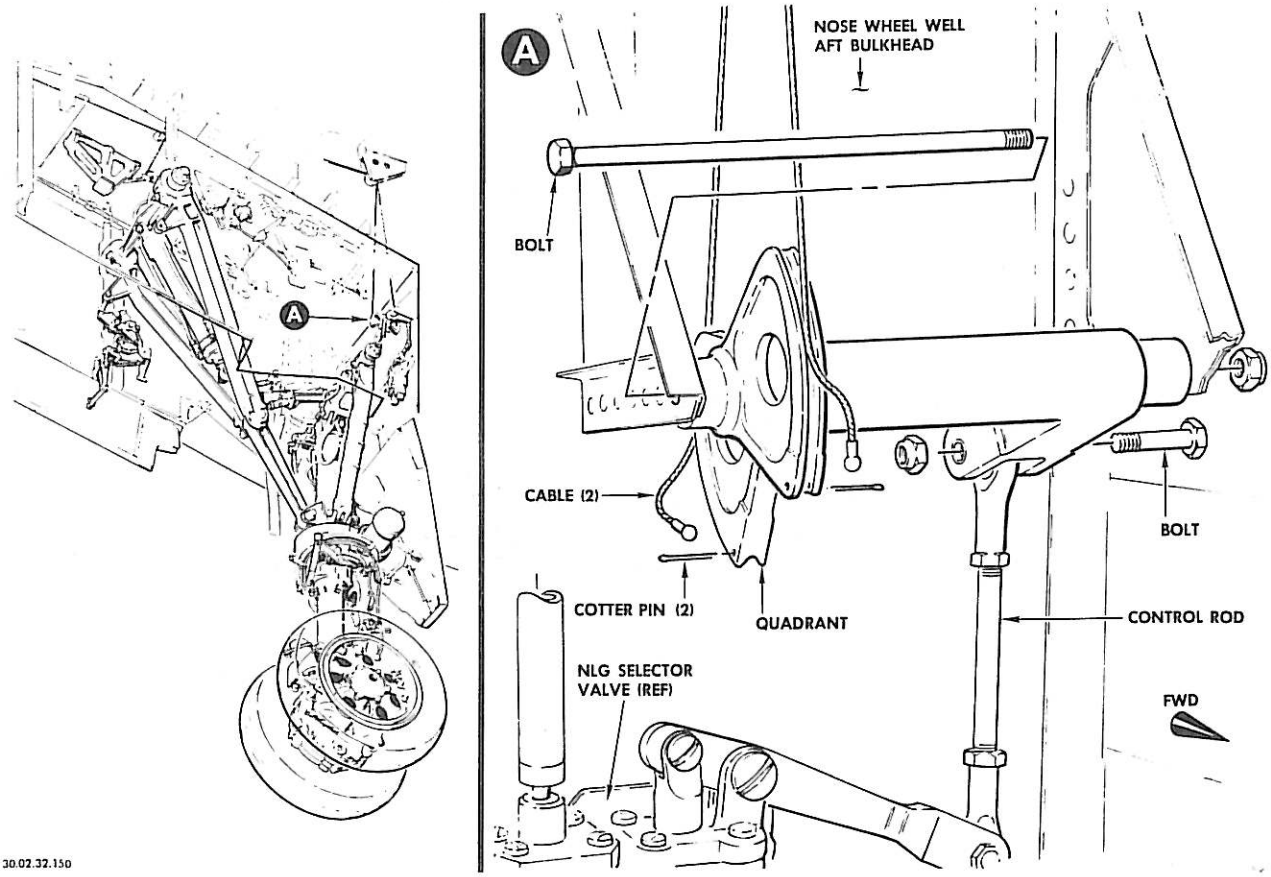
(4) Remove pivot bolt and nut attaching cable quadrant to the support brackets; remove cable quadrant.

E. Install NLG Selector Valve Normal Control Quadrant.

(1) Place control quadrant between support brackets on the nose wheel well aft bulkhead, with lever end of quadrant outboard; install pivot bolt and nut securing control quadrant to the support brackets.

(2) Connect control cables to the quadrant and secure with cotter pins.

(3) Remove warning tag and close HYD PUMP MOTOR CONT circuit breaker.



Nose Landing Gear Selector Valve
Normal Control Quadrant Installation
Figure 201

(4) Perform Adjustment/Test Landing Gear Normal Controls - Rigging and Adjustment (refer to 32-5-0).

NOTE: If only the NLG selector valve normal control quadrant has been replaced and no other rigging or adjustment has been changed, adjustment can be accomplished per 32-5-0, steps 1.B.(5), 1.C.(3), 1.C.(5), 1.C.(6), 1.C.(8) and 1.C.(11) thru 1.C.(13). Operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.D.(5)(a) thru 2.D.(5)(d) 9), 2.D.(6)(b) thru 2.D.(6)(c) 5), and 2.I.(1) thru 2.I.(5).

LANDING GEAR EMERGENCY RELEASE SYSTEM - DESCRIPTION AND OPERATION

1. General

The landing gear emergency release system is entirely independent of the normal control system, and can only be used for lowering the gear; see Figure 1. The system consists of a mechanical linkage arrangement of cables, quadrants and cams. A lever, located at the rear of the pilots' control pedestal, controls the system. The lever operates the NLG and MLG selector valves, the MLG emergency door-open (pneumatic) valve, and the landing gear up-locks and door up-locks located in the wheel wells. A NLG emergency lowering control assembly and a MLG emergency release sequencing shaft establish the proper sequencing of operations. A compensator assembly located on top of the MLG emergency release sequencing shaft provides for temperature compensation, to ensure proper cable tension. A spring-loaded hold-open stop behind the emergency release lever prevents the lever from being inadvertently returned to the normal (up) position. The system uses the No. 2 hydraulic system accumulator air charge to open the MLG doors; see 32-2-0, Figure 1. See 32-0, Figure 2 for location of emergency release lever on pilots' control pedestal.

When the landing gear emergency release lever is operated, the following operations take place in the sequence listed:

A. NLG hydraulic system vents to return (through the NLG selector valve).

B. NLG door up-lock releases.

C. MLG hydraulic system vents to return (through the MLG selector valve).

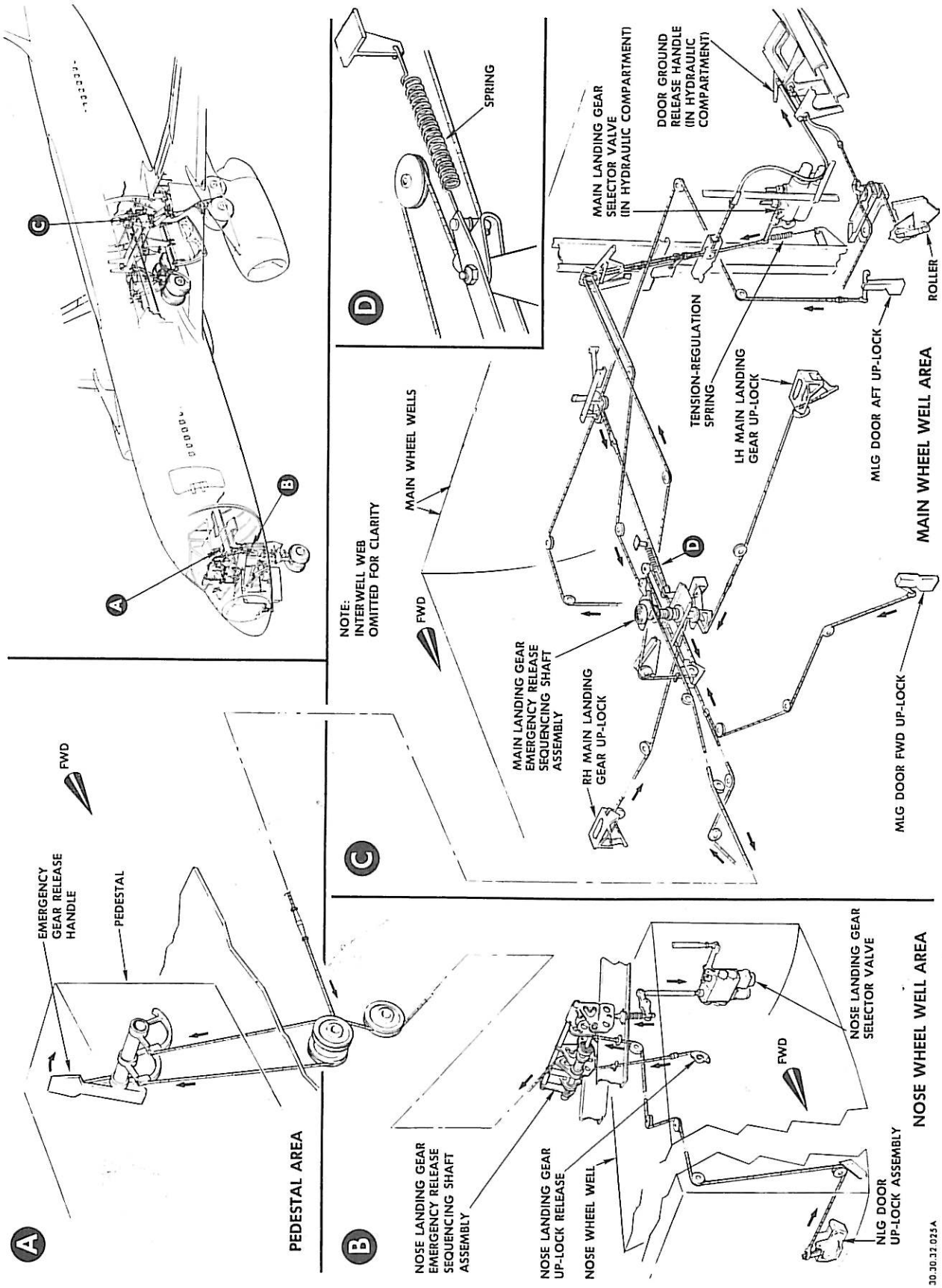
D. No. 2 hydraulic system accumulator applies pneumatic pressure to the MLG door actuating cylinders (through the emergency door-open valve).

E. MLG door up-locks release.

F. MLG up-locks release.

G. NLG locking mechanism releases.

Should the landing gear emergency release system jam or malfunction during attempt to extend landing gear, the individual system cables may still be pulled by gaining access to the electronics compartment. The NLG emergency release cables are identified by stenciling on the audio junction panel cover at fuselage sta 250. The MLG emergency release cable is wrapped with red tape at fuselage sta 330.



Landing Gear Emergency Control System
Figure 1

The landing gear emergency release system also incorporates return springs to automatically reset the system after use. Resetting the system is accomplished by releasing the emergency release lever hold-open stop and returning the lever to the normal (up) position. The landing gear can then be retracted and extended by the landing gear normal control system (providing no fault exists in the normal control system). The No. 2 hydraulic system accumulator must be recharged and the hydraulic systems bled following gear emergency extension.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 32-58.

Insert facing 32-6-0, Page 1, dated Jan. 25/63 (or subsequent).

The information on the noted facing page is applicable to all airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-41, substitute the following information where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete paragraph beginning with "Should the landing gear emergency release system jam or malfunction - - - - -" and replace with the following:

Should any phase of the NLG emergency release system jam during attempt to extend gear with emergency system, the MLG can still be extended with the emeregency release system. Shear rivets secure the NLG system input quadrant to the sequencing shaft in the NLG emergency lowering control assembly. These rivets will shear when increased force is applied to the landing gear emergency release lever, and thus allow the quadrant to rotate on the shaft. The emergency release lever is then free to operate the MLG emergency release system.

LANDING GEAR EMERGENCY CONTROL SYSTEM - MAINTENANCE PRACTICES

1. Adjustment/Test Landing Gear Emergency Controls - Rigging and Adjustment (see Figure 201)

A. Equipment Required.

(1) Hydraulic test unit (Skydrol 500A hydraulic fluid) capable of delivering 3000 psig at 16 gpm.

NOTE: Hydraulic test unit shall have a metering device to limit landing gear retraction or extension time to 15 seconds minimum.

(2) Airplane jacking equipment.

(3) Suitable safety device to support NLG and MLG during gear up-lock emergency release adjustments.

(4) Guard rails to keep personnel out of wheel well areas.

(5) 3/32-inch and 1/4-inch rigging pins.

B. Preparation.

(1) Ensure landing gear ground safety pins are installed.

(2) Jack airplane at wing and fuselage jack points until landing gear wheels clear the ground (refer to Chapter 7, LIFTING AND SHORING).

(3) Remove passenger cabin floor panels above MLG emergency release sequencing shaft (refer to Chapter 53, FUSELAGE).

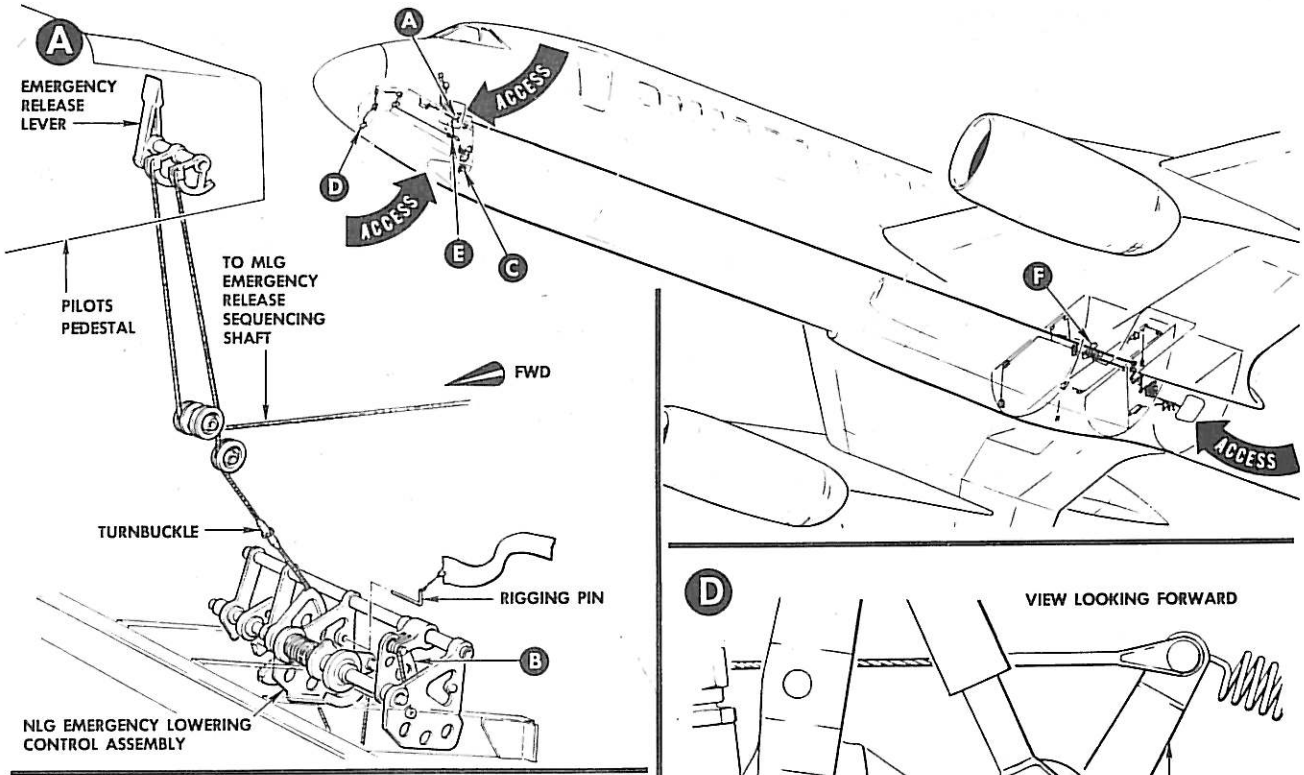
(4) Remove fiberglas cover at lower end of MLG emergency release sequencing shaft in right-hand main wheel well.

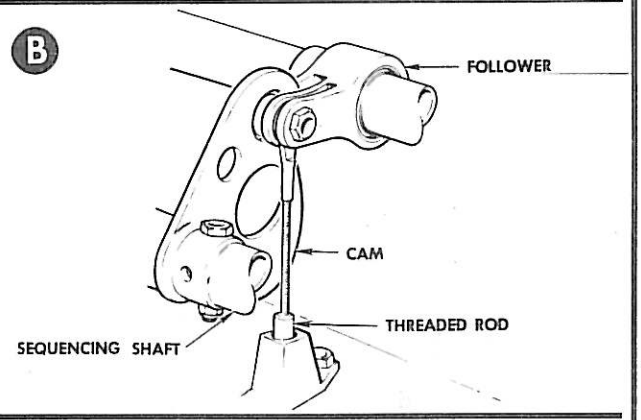
(5) Disconnect MLG fairing rods from drag braces and tie fairings away from landing gear (refer to 32-13-2).

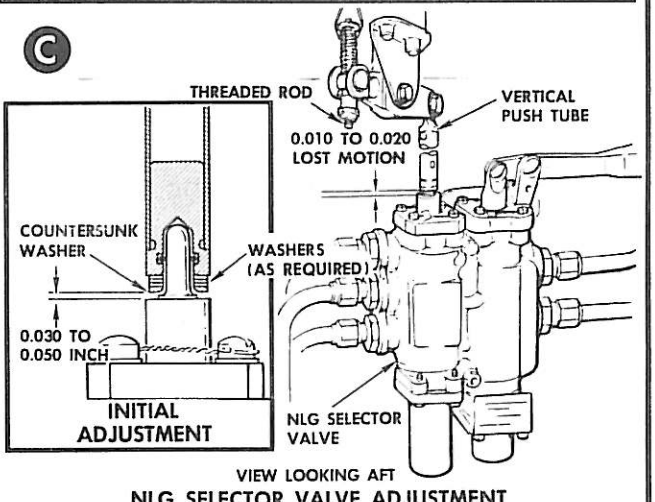
(6) Place guard rails around wheel well areas.

(7) Check that all cable guards are correctly installed and that control cables are in pulley grooves. Also check pulleys for freedom of rotation.

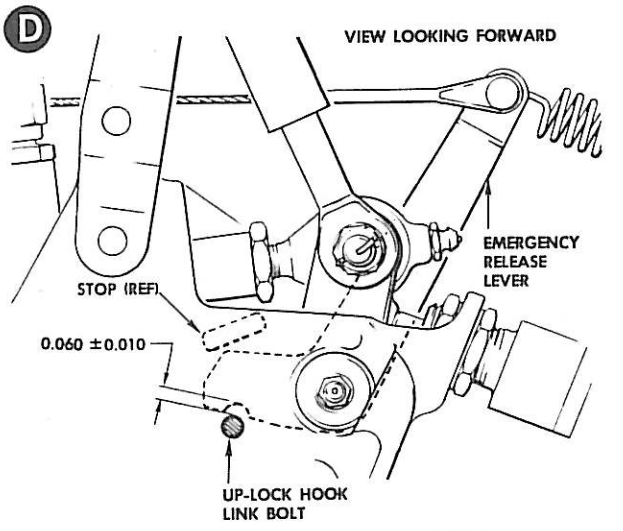
(8) Connect hydraulic test unit to No. 1 and No. 2 hydraulic systems (refer to Chapter 29, HYDRAULIC POWER). Do not apply hydraulic pressure.



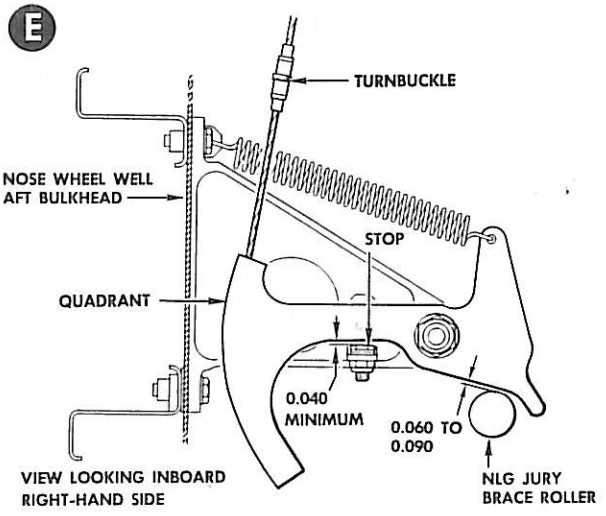




NLG SELECTOR VALVE ADJUSTMENT



NLG DOOR UP-LOCK ADJUSTMENT



NLG EMERGENCY RELEASE QUADRANT

30.02.32.122-1A

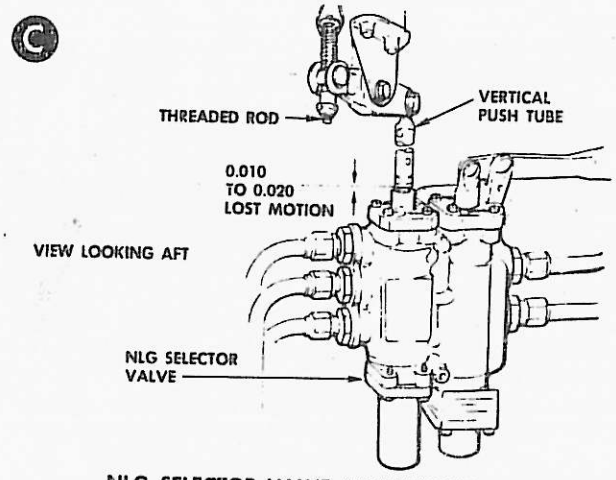
TEMPORARY REVISION NO. 32-49.

Insert facing 32-6-0, Page 202, dated Sep. 17/62 (or subsequent).

The illustration in this temporary revision is to be used for airplanes not modified per Service Bulletin No. 32-14. For those airplanes that have been modified per Service Bulletin No. 32-14, use Detail C on noted facing page.

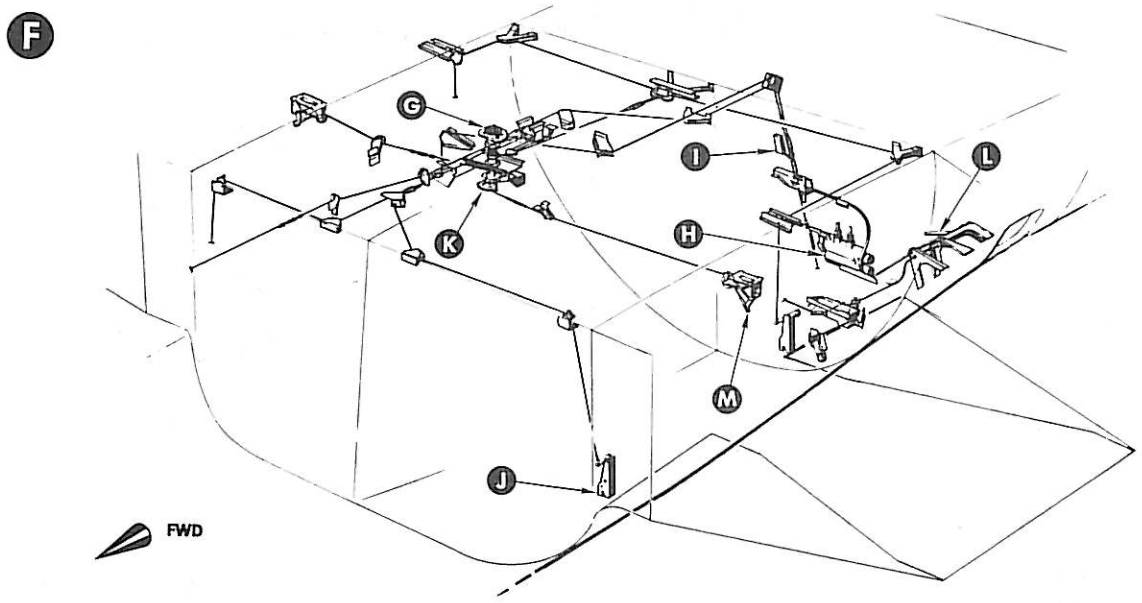
Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

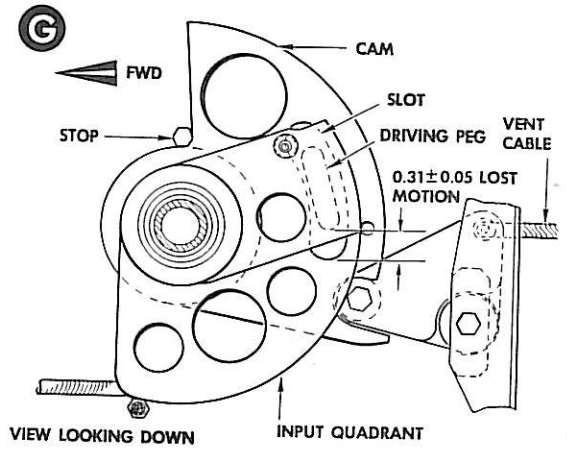
Substitute the following in place of Detail C on noted facing page for unmodified airplanes:



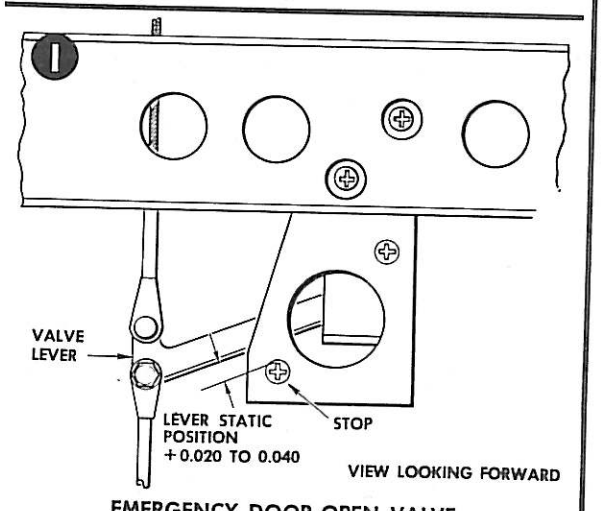
NLG SELECTOR VALVE ADJUSTMENT

30 02 32 172 1 –TR



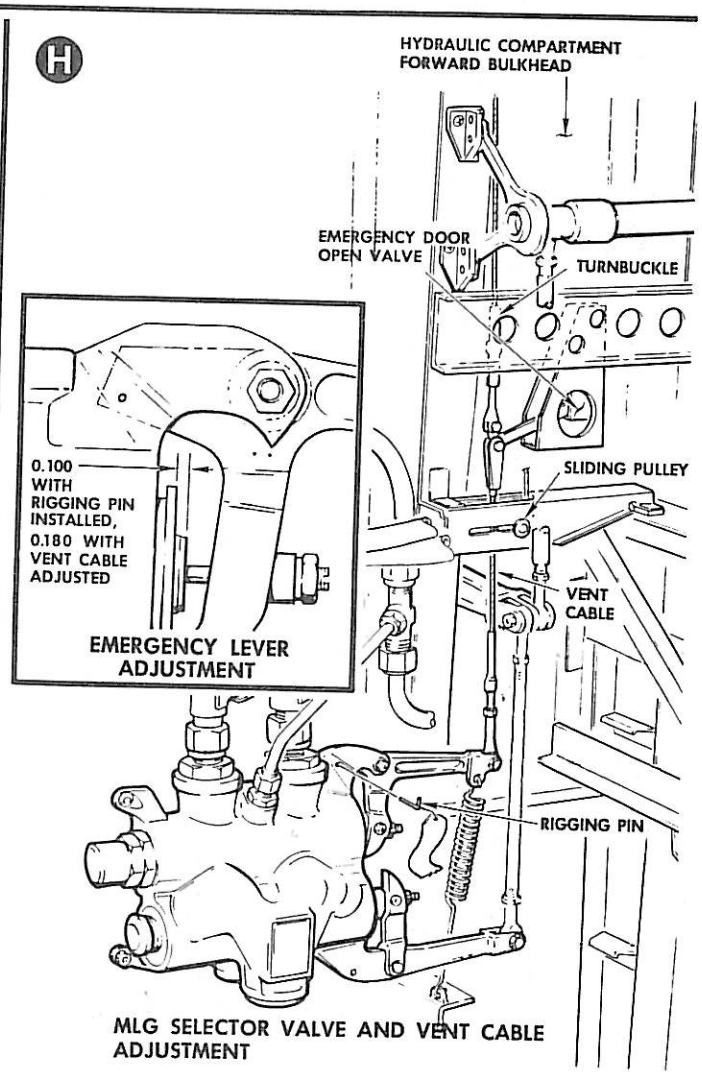


MLG EMERGENCY RELEASE SEQUENCING SHAFT UPPER END

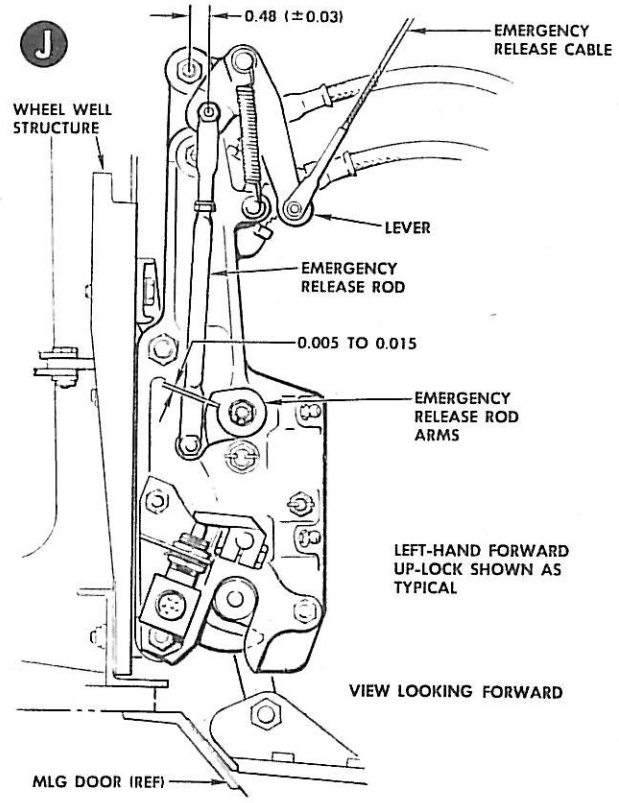


30.02.32.122-2A

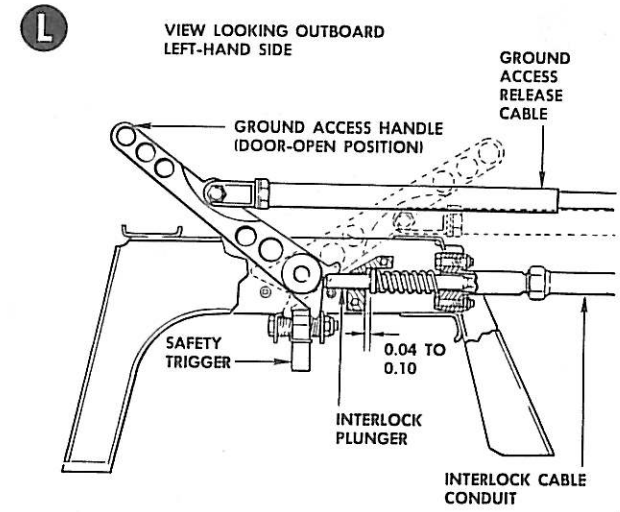
EMERGENCY DOOR-OPEN VALVE



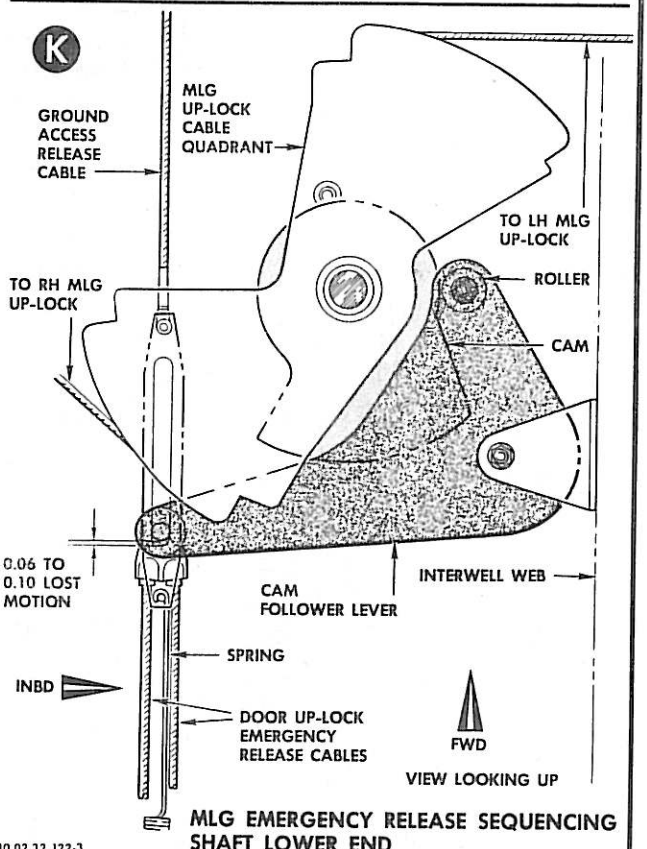
MLG SELECTOR VALVE AND VENT CABLE ADJUSTMENT



MLG DOOR UP-LOCK

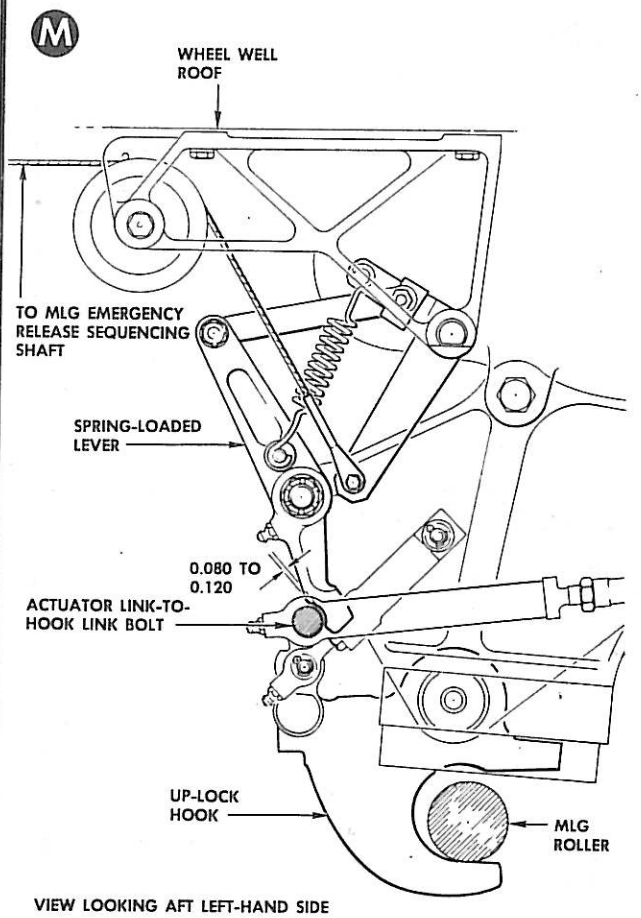


MAIN WHEEL WELL GROUND ACCESS HANDLE



MLG EMERGENCY RELEASE SEQUENCING SHAFT LOWER END

30.02.32.122-3



MLG UP-LOCK EMERGENCY RELEASE

Figure
Detail

C. Rigging Procedure.

NOTE: Unless otherwise directed, all adjustments are accomplished with landing gear emergency release lever in flight compartment in the normal (up) position. Optimum ambient temperature during rigging procedure is 70 degrees F. (21 degrees C.). To ensure accurate adjustment of cable length and tension, rigging should not be performed with airplane standing in direct sunshine or freezing wind. Rigging adjustments should never be made immediately following a marked atmospheric temperature change.

(1) Rig NLG emergency control cable as follows:

NOTE: The NLG emergency control cable runs from a quadrant at the landing gear emergency release lever in flight compartment to the input quadrant in NLG emergency lowering control assembly, above nose wheel well.

(a) Check that landing gear emergency release lever is in normal (up) position. A

(b) Align rigging pin holes in NLG emergency lowering control support and in input cable quadrant; install 1/4-inch diameter rigging pin. A

(c) Adjust turnbuckle until rigging pin will slide freely through rigging pin holes. Safety turnbuckle. A

(d) Remove rigging pin. A

(2) Rig NLG selector valve vent cable as follows:

NOTE: Vent cable adjustment is made in nose wheel well, left-hand side.

(a) Check that landing gear emergency release lever is in normal (up) position. A

(b) Install 1/4-inch diameter rigging pin through NLG emergency lowering control assembly input quadrant and right-hand support. A

Figure Detail

(c) Loosen nuts on threaded rod end of cable extending through top of nose wheel well until vertical push tube rests on overtravel plunger of vent spool in NLG selector valve. — B,C

(d) Add or remove washers between the vertical push tube and countersunk washer to obtain 0.030-to 0.050-inch clearance between washer stack and the upper end of vent spool. — C

NOTE: Measure clearance only between the washer stack and vent spool (washer stack held against vertical push tube). Incorrect adjustment can be obtained if clearance is measured at top of washer stack.

(e) Pull down gently on threaded rod end of selector valve vent cable to ensure that follower at upper end of cable is in contact with cam in NLG emergency lowering control assembly. — B,C

(f) Screw adjusting nut on threaded rod end up or down as necessary to provide 0.010 to 0.020-inch lost motion in vertical push tube, before push tube imparts motion to vent spool in NLG selector valve. — B,C

NOTE: Step (d), preceding, must be accomplished prior to adjusting vertical push tube lost motion.

(g) Lock vent cable adjusting nut with locknut. — C

(h) Remove rigging pin from NLG emergency lowering control assembly. — A

(i) Verify that lost motion established in step (f), preceding, still exists. — C

(3) Recheck NLG emergency control cable and NLG selector valve vent cable adjustments. Verify that 1/4-inch diameter rigging pin used in steps (1) and (2), preceding, can be inserted without force through holes used in each rigging operation. If not, the turnbuckle on NLG emergency control cable, or the adjusting nut on NLG selector valve vent cable must be adjusted until the rigging pin fits freely in rigging holes of NLG emergency lowering control assembly. Immediately following any adjustments, verify existence of lost motion established in step (2) (f).

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 32-50.

Insert facing 32-6-0, Page 206, dated Sep. 17/62 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-14, delete the following instruction and NOTE where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete text in step 1.C.(2)(d) and following NOTE and replace with the following:

(d) Deleted.

Figure Detail

(4) Rig NLG door up-lock release cable as follows:

NOTE: The NLG door up-lock release cable runs between the NLG emergency lowering control assembly (left side), above nose wheel well, to the door up-lock mechanism on nose wheel well forward bulkhead.

(a) Verify that landing gear emergency release lever in flight compartment is in normal (up) position. A

(b) Manually actuate NLG door up-lock to the locked position. Adjust turnbuckle on forward left side of nose wheel well to provide 0.060 (±0.010)-inch clearance between notch in lower edge of emergency release lever and hook link bolt. D

(c) Return NLG door up-lock to the unlocked position.

(5) Rig NLG up-lock release cable as follows:

(a) Disconnect both NLG doors at lower link assembly connection to left and right door mechanism walking beams; tie doors clear of wheel well.

(b) Remove NLG ground safety pin.

(c) Pressurize No. 1 hydraulic system (refer to Chapter 29, HYDRAULIC POWER).

(d) Move landing gear control lever to UP position and retract gear. Limit LG retraction time to 15 seconds minimum.

WARNING: BEFORE PROCEEDING WITH NLG UP-LOCK CABLE RIGGING, STATION A MAN IN THE FLIGHT COMPARTMENT TO INSURE THAT THE LANDING GEAR NORMAL CONTROL LEVER AND EMERGENCY RELEASE LEVER ARE NOT INADVERTENTLY MOVED. SERIOUS INJURY TO PERSONNEL COULD RESULT IF EITHER LEVER IS ACTUATED DURING RIGGING PROCEDURE.

(e) Place a suitable support beneath NLG to prevent gear from accidentally extending.

Figure Detail

(f) Adjust turnbuckle on cable in nose wheel well until a gap of 0.060 to 0.090 inch exists between NLG jury brace roller and lever on NLG up-lock release quadrant. Safety turnbuckle. — E

(g) After completing step (f), above, check clearance between up-lock release quadrant and adjustable stop. Add or remove shims at adjustable stop to obtain 0.040-inch minimum clearance. — E

(h) Remove support beneath NLG and return gear to the down-and-locked position.

(i) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(j) Install NLG ground safety pin.

(6) Rig MLG emergency control cable as follows:

NOTE: The MLG emergency control cable is routed from quadrant on landing gear emergency release lever to the input quadrant on MLG emergency release sequencing shaft, above right-hand main wheel well. Access is gained through the passenger cabin floor.

(a) Check that landing gear emergency release lever in flight compartment is in normal (up) position. — A

(b) Check that slotted cam on MLG emergency release sequencing shaft is against stop. Slotted cam must remain against stop throughout adjustment. — G

NOTE: Pull down on MLG selector valve vent cable to hold slotted cam against stop.

(c) Shorten MLG emergency control cable at turnbuckle until the driving peg on underside of the input quadrant contacts the end of slot in slotted cam. Lengthen cable 0.31 (±0.05) inch and safety turnbuckle. — G

NOTE: Above measurement is for 70 degrees F (21 degrees C) ambient temperature. Decrease dimension 0.04 inch for each 10 degrees F (5.5 degrees C) increase in ambient temperature; increase dimension 0.04 inch for each 10 degrees F (5.5 degrees C) decrease in ambient temperature.

(7) Rig MLG selector valve vent cable as follows: Figure Detail

NOTE: Vent cable is routed from lever adjacent to the MLG emergency release sequencing shaft upper cam to the MLG selector valve in hydraulic compartment. Access is gained through the passenger cabin floor and hydraulic compartment.

(a) Check that landing gear emergency release lever in flight compartment is in normal (up) position; that cam for MLG selector valve vent is against its stop on sequencing shaft; and that MLG selector valve vent cable is not deflected from a straight run by sliding pulley. A,G,H

(b) Disconnect cables from lever on emergency door-open valve and check that lever clears stop (spacer) below the lever. H,I

(c) Connect upper vent cable to emergency door-open valve lever and adjust turnbuckle to increase clearance checked in step (b), preceding, an additional 0.020 to 0.040 inch. Safety turnbuckle. I

(d) Install 3/32-inch diameter rigging pin through emergency lever and body of MLG selector valve. H

(e) Check that the MLG selector valve vent spool protrudes 0.100 inch from gland nut; adjust vent spool link connection to emergency lever as required. Tighten link locknut to torque value of 20 to 25 inch-pounds and safety-wire to lever spacer. H

(f) Remove rigging pin.

(g) Connect lower cable to emergency door-open valve lever and adjust turnbuckle until vent spool protrudes 0.180 inch from gland nut in selector valve. Safety turnbuckle. H

(8) Rig MLG door up-lock release cables as follows:

NOTE: The MLG door up-lock cable system is located in each MLG wheel well. Adjustment of any one of the four door up-locks affects the other three. When all four up-locks are correctly adjusted, the cable system will be in balance.

(a) Check that MLG doors are closed and locked.

(b) Check that landing gear emergency release lever in flight compartment is in normal (up) position, and that lower cam follower is against cam on MLG emergency release sequencing shaft (right-hand main wheel well). A,K

Figure Detail

(c) At each MLG door up-lock, disconnect emergency release rod from lever and adjust release cable turnbuckles till 0.48 (±0.03)-inch dimension exists between emergency release lever attachment centerline and emergency release rod attachment centerline. Safety turnbuckles. — J

(d) Adjust length of each MLG door up-lock emergency release rod till gap between abutment faces of arms in emergency release linkage is 0.005 to 0.015 inch; reconnect rods to emergency release levers. — J

(9) Rig main wheel well ground access cable as follows:

NOTE: This cable runs from the ground access handle in hydraulic compartment to the slotted links at lower cam follower lever on MLG emergency release sequencing shaft.

(a) With the airplane supported on landing gear, open MLG doors as follows:

WARNING: PRIOR TO ACCOMPLISHING STEP 1) FOLLOWING, CHECK THAT PERSONNEL AND EQUIPMENT ARE CLEAR OF MLG DOORS. PNEUMATIC PRESSURE FROM THE NO. 2 HYDRAULIC SYSTEM ACCUMULATOR WILL ACTUATE DOOR CYLINDERS AND OPEN DOORS WITH CONSIDERABLE FORCE.

1) Operate landing gear emergency release lever in flight compartment to just open MLG doors. Rotate release lever through approximately 60 degrees. — A

2) Allow landing gear emergency release lever to return toward normal (up) position until hold-open stop (painted red) behind lever prevents further motion. MLG doors will remain open. — A

WARNING: STATION ONE MAN IN FLIGHT COMPARTMENT TO ENSURE THAT LANDING GEAR EMERGENCY RELEASE LEVER IS NOT MOVED. DO NOT PRESSURIZE HYDRAULIC SYSTEMS. SERIOUS INJURY TO PERSONNEL COULD RESULT.

(b) In right main wheel well, check that lower cam follower lever is in contact with cam on MLG emergency release sequencing shaft. — K

Figure Detail

(c) Adjust ground access cable at turnbuckle in hydraulic compartment until cable can be pulled 0.06 to 0.10 inch before it imparts movement, through slotted links, to the lower cam follower lever. Safety turnbuckles. K

(d) Depress hold-open stop (painted red) behind landing gear emergency release lever in flight compartment and allow lever to return to normal (up) position.

(e) In hydraulic compartment, actuate ground access handle to aft (doors open) position. L

(f) Ensure that safety trigger locks ground access handle in the aft position. L

(g) Check that MLG doors are opened sufficiently to clear the rocking levers (safety rollers) on the aft bulkhead of each main wheel well.

NOTE: During the following adjustments, the ground access handle must be vibrated manually to ensure that the spring-loaded interlock plunger is free to rig load the cable.

(h) Adjust turnbuckle in interconnect cable between rocking levers to increase length of cable until spring at the handle bottoms out and can no longer apply any rig load to cable.

(i) Adjust interconnect cable turnbuckle until spring is pulled off its stop 0.04 to 0.10 inch. Safety turnbuckle. L

(j) Pressurize No. 2 hydraulic system (refer to Chapter 29, HYDRAULIC POWER).

(k) Close MLG doors.

WARNING: CHECK THAT ALL PERSONNEL ARE CLEAR OF MLG DOORS PRIOR TO ACCOMPLISHING STEP (1) FOLLOWING.

(1) Release safety trigger and move ground access handle to forward (doors closed) position. MLG doors shall lock closed. L

(10) Rig MLG up-lock release cables as follows:

(a) With airplane on jacks, remove MLG ground safety pins.

Figure Detail

(b) Pressurize No. 2 hydraulic system (refer to Chapter 29, HYDRAULIC POWER).

(c) Move landing gear normal control lever to UP position and retract gear. Limit LG retraction time to 15 seconds minimum.

(d) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

WARNING: BEFORE PROCEEDING WITH MLG UP-LOCK CABLE RIGGING, STATION A MAN IN THE FLIGHT COMPARTMENT TO ENSURE THAT THE LANDING GEAR NORMAL CONTROL LEVER AND EMERGENCY RELEASE LEVER ARE NOT MOVED. SERIOUS INJURY TO PERSONNEL COULD RESULT IF EITHER LEVER IS ACTUATED DURING RIGGING PROCEDURE.

(e) Operate ground access handle in hydraulic compartment to open MLG doors. Insure that safety trigger secures handle in aft (doors open) position. L

(f) Place a suitable support beneath each MLG.

(g) Adjust turnbuckle in cable to MLG up-lock emergency release mechanism, in top of each wheel well, to provide 0.080 to 0.120-inch clearance between lower end of spring-loaded lever and actuator link-to-hook link bolt. Safety turnbuckles. M

(h) Remove supports from beneath each MLG.

(i) Pressurize No. 2 hydraulic system (refer to Chapter 29, HYDRAULIC POWER).

(j) Close MLG doors.

WARNING: CHECK THAT ALL PERSONNEL ARE CLEAR OF MLG DOORS PRIOR TO ACCOMPLISHING STEP (k), FOLLOWING.

(k) Move ground access handle to forward (doors closed) position. L

(l) Lower landing gear to down-and-locked position and install ground safety pins.

(m) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(11) Connect MLG fairing rods to drag braces (refer to 32-13-2).

(12) Install passenger cabin floor panels above MLG emergency release sequencing shaft.

(13) In right main wheel well, replace cover on lower portion of MLG emergency release sequencing shaft.

(14) Charge No. 2 hydraulic system accumulator with dry filtered air or nitrogen (refer to Chapter 12, SERVICING).

(15) Perform landing gear emergency extension check (refer to 32-0, steps 2.C.(4) thru 2.C.(13), 2.G., and 2.I.).

(16) Perform main wheel well ground access system operational check (refer to 32-0, steps 2.C.(10), 2.H., and 2.I.(3)).

LANDING GEAR EMERGENCY RELEASE LEVER - MAINTENANCE PRACTICES

1. Removal/Installation Landing Gear Emergency Release Lever Assembly (see Figure 201)

A. Equipment Required - None.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Relieve air pressure in No. 2 hydraulic system accumulator (refer to Chapter 12, SERVICING).

(3) Open and attach warning tags to all applicable circuit breakers for any electrically operated components which surround the control lever assembly.

C. Remove Landing Gear Emergency Release Lever.

(1) Remove the aft cover plates on each side of the pedestal housing.

(2) Release tension on the following cables:

(a) NLG emergency control cable (attached to left-hand quadrant). Back off on turnbuckle located at approximately fuselage sta 243.

(b) MLG emergency control cable (attached to quadrant adjacent to control lever). Back off turnbuckle located at approximately fuselage sta 270.

(3) Remove cotter pins from cable quadrants and disconnect cables from quadrants.

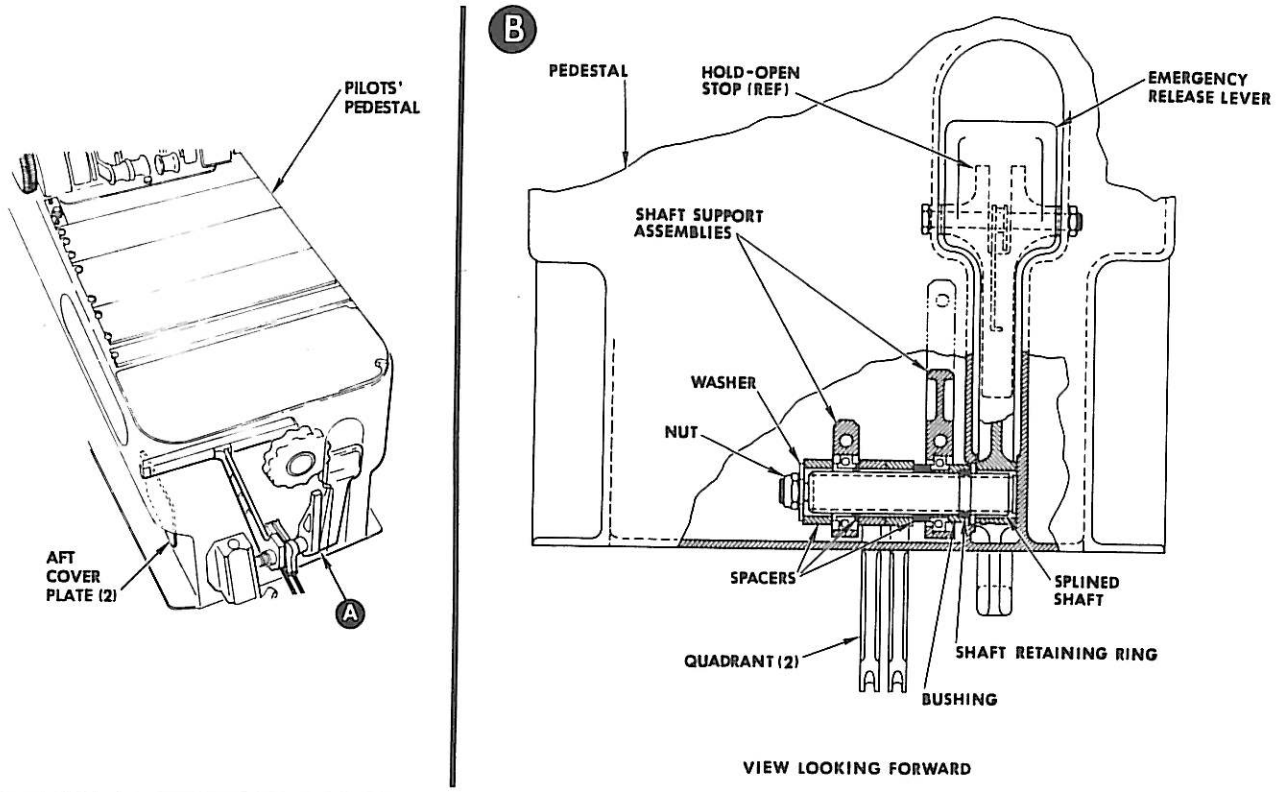
(4) Remove four screws from cross brace riveted to the splined shaft left-hand support.

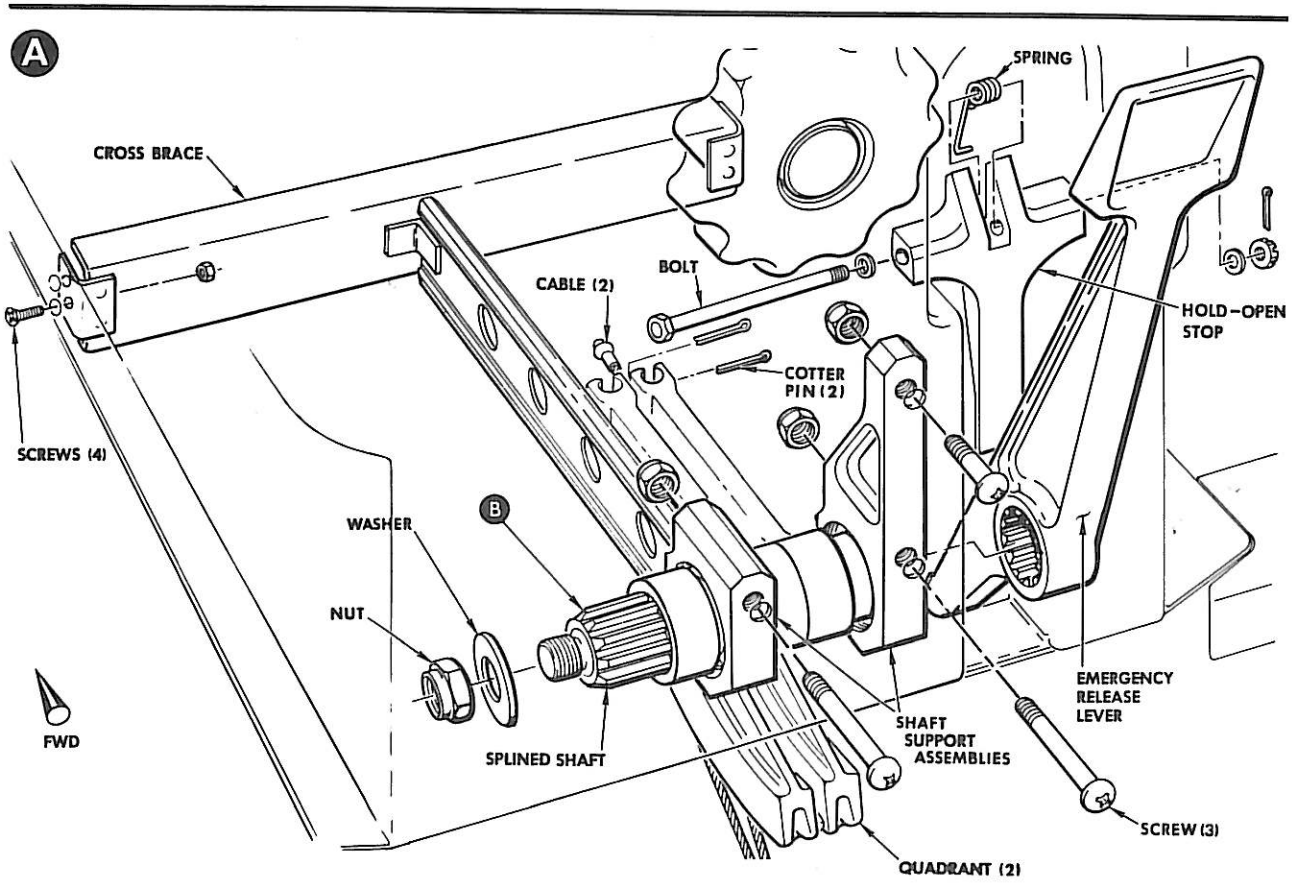
(5) Remove nut and washer from splined shaft.

(6) Remove three screws which secure shaft support assemblies to pedestal housing.

(7) Slide quadrants and support assemblies to the left on splined shaft enough to gain access to the shaft retaining ring at left side of lever; remove retaining ring halves.

(8) Slide splined shaft to the left till shaft clears release lever and remove lever. Remove shaft and support assemblies from pedestal.


PILOTS' PEDESTAL
AFT COVER PLATE (2)
A
B
PEDESTAL
HOLD-OPEN STOP (REF)
EMERGENCY RELEASE LEVER
SHAFT SUPPORT ASSEMBLIES
WASHER
NUT
SPACERS
SPLINED SHAFT
QUADRANT (2)
SHAFT RETAINING RING
BUSHING
VIEW LOOKING FORWARD


A
SPRING
CROSS BRACE
CABLE (2)
BOLT
HOLD-OPEN STOP
COTTER PIN (2)
SCREWS (4)
WASHER
B
NUT
FWD
SPLINED SHAFT
SHAFT SUPPORT ASSEMBLIES
EMERGENCY RELEASE LEVER
SCREW (3)
QUADRANT (2)

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D. Install Landing Gear Emergency Release Lever.

(1) Position splined shaft, quadrants and support assemblies inside pedestal housing and move splined shaft far enough to the left to allow release lever installation.

(2) Insert release lever (in the up position) into pedestal housing and align indexing splines of shaft and lever; push splined shaft to the right till it fully engages lever splines.

(3) Install retaining ring halves in recess of splined shaft, at left side of lever, then slide quadrants and support assemblies to the right to align support assembly screw holes with holes in pedestal.

(4) Install three screws securing shaft and lever support assemblies to pedestal housing.

(5) Secure cross brace (riveted to splined shaft, left-hand support) with four screws through pedestal housing.

(6) Install washer and nut on left end of splined shaft.

(7) Connect control cables to respective quadrants and secure with cotter pins.

(8) Rig NLG and MLG emergency control cables (refer to 32-6-0, steps 1.B.(3), 1.C.(1), 1.C.(6), and 1.C.(12)).

(9) Remove warning tags and close all circuit breakers which were opened for the removal procedure.

(10) Install cover plates on pedestal housing.

(11) Charge No. 2 hydraulic system accumulator with dry filtered air or nitrogen (refer to Chapter 12, SERVICING).

(12) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0).

NOTE: If only the landing gear emergency release lever has been replaced and no other rigging or adjustment has been changed, operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.G., and 2.I.

MAIN LANDING GEAR (MLG) EMERGENCY RELEASE SEQUENCING SHAFT - MAINTENANCE PRACTICES

1. Removal/Installation MLG Emergency Release Sequencing Shaft (see Figure 201)

A. General.

The MLG emergency release sequencing shaft is located to the right of the fuselage centerline at approximately fuselage sta 918. Gain access to the assembly by opening the MLG doors and removing the passenger cabin aisle floor panels above the main wheel wells.

B. Equipment Required. Spring scale capable of measuring 0 to 20 pounds in one-pound increments.

C. Materials Required.

(1) AN470AD5 rivets, as required.

(2) AN470DD6 rivets, as required.

(3) R3001-T6-8 Huck lockbolts or equivalent, as required.

(4) LC-C6 Huck lockbolt collars or equivalent, as required.

D. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Open and attach warning tag to the HYD PUMP MOTOR CONT circuit breaker, on main circuit breaker panel.

(3) Relieve air pressure in No. 2 hydraulic system accumulator (refer to Chapter 12, SERVICING).

(4) Ascertain that landing gear emergency release lever is in the normal (up) position. Attach warning placard.

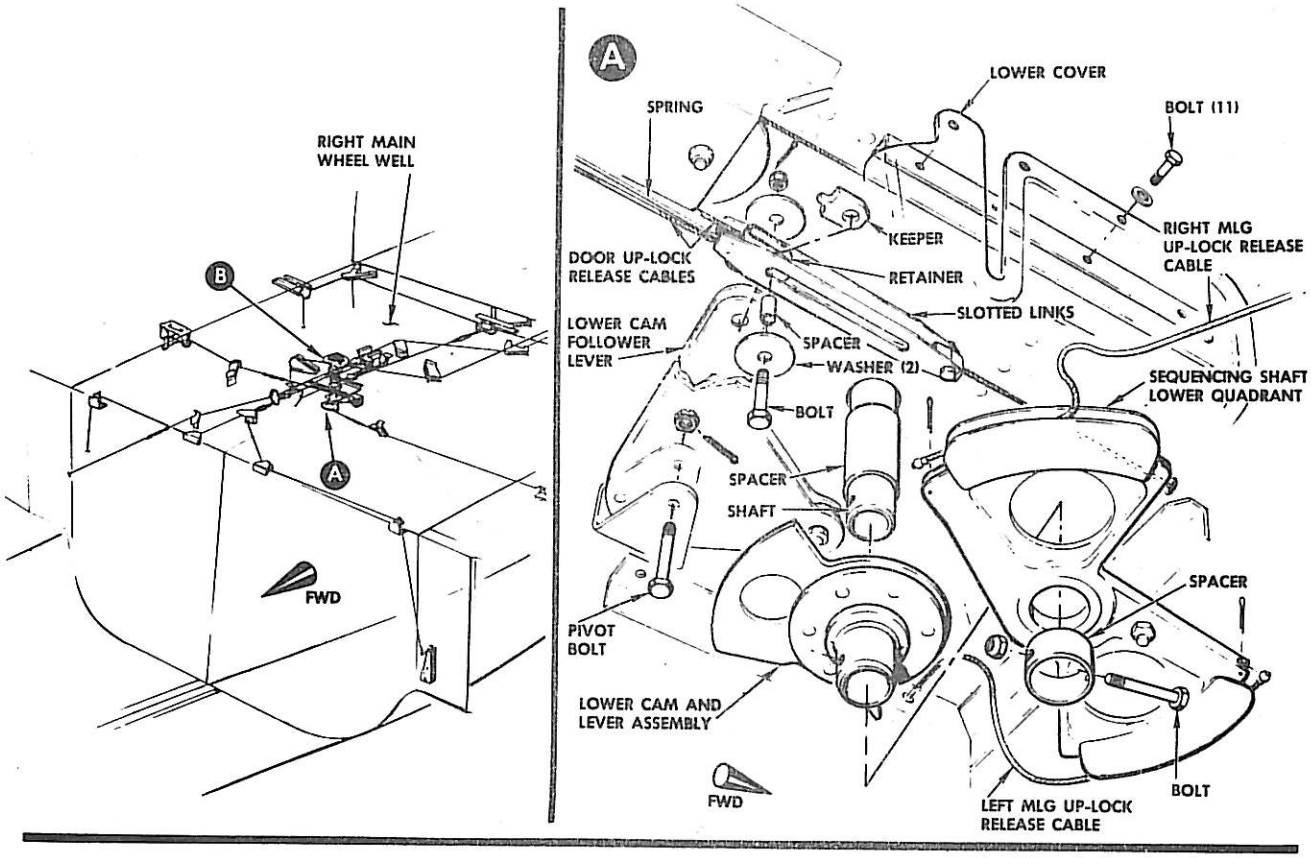
(5) Remove passenger cabin floor panels above MLG emergency release sequencing shaft (refer to Chapter 53, FUSELAGE).

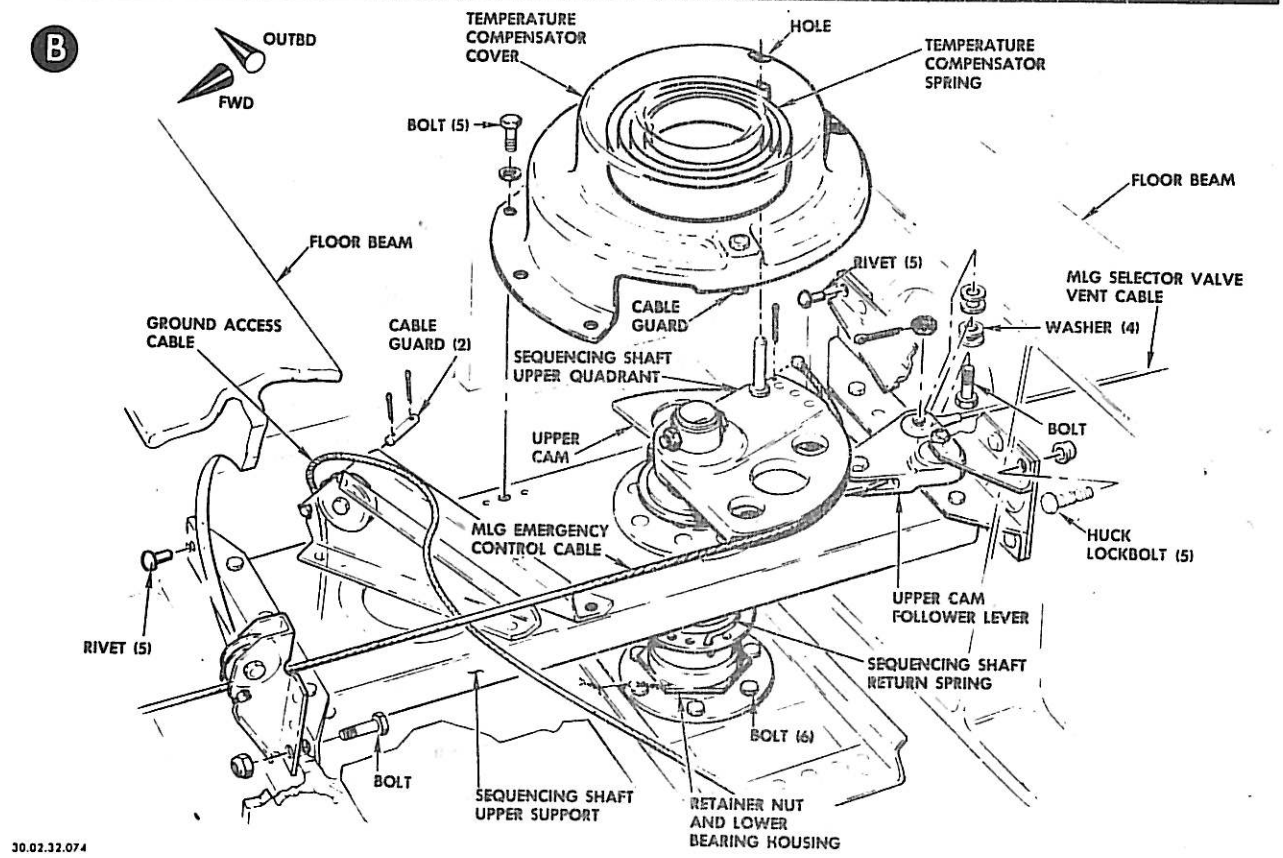
(6) Operate ground access handle in hydraulic compartment to release MLG door up-locks; manually open MLG doors.

E. Remove MLG Emergency Release Sequencing Shaft.

(1) Remove eleven bolts and washers securing sequencing shaft lower cover in right-hand main wheel well; remove cover.

(2) Disconnect spring between bracket in main wheel well and the follower lever of the lower cam on sequencing shaft.





Main Landing Gear Emergency Release Sequencing Shaft Installation
Figure 201

(3) Back off turnbuckles on MLG up-lock emergency release cables in each main wheel well. Remove cotter pins and disconnect cables from sequencing shaft lower cable quadrant.

(4) Remove bolt and hardware attaching MLG door up-lock release cables to follower lever of lower cam, in right-hand main wheel well.

(5) Remove lower cam follower lever pivot bolt, nut, and cotter pin; remove lever.

(6) Remove bolt and nut at lower end of sequencing shaft; remove spacer, MLG up-lock release quadrant, cam and lever assembly, and spacer.

(7) Insert a suitable pin through upper hole in temperature compensator cover and engage end of temperature compensator spring, to prevent spring from unwinding when cover is removed.

(8) Remove five bolts and washers securing temperature compensator cover to sequencing shaft upper support; remove cover and spring assembly. Allow compensator spring to slowly unwind and record number of turns spring unwinds, to facilitate installation.

(9) Back off turnbuckle on MLG emergency control cable connected to upper quadrant of sequencing shaft. Turnbuckle is located at approximately fuselage sta 860. Remove cotter pin and disconnect cable from sequencing shaft quadrant.

(10) Remove bolt, washers, nut, and cotter pin connecting MLG selector valve vent cable to lever of upper cam follower.

(11) Remove cable guards from ground access cable pulley bracket on sequencing shaft upper support; remove cable from pulley.

(12) Cut safety wire on retainer nut at sequencing shaft lower bearing. Remove six bolts and nuts attaching sequencing shaft lower bearing housing to top of right-hand main wheel well.

(13) Remove bolt and five rivets attaching forward end of sequencing shaft upper support to floor beam forward of sequencing shaft (refer to Structural Repair Manual for proper rivet removal procedure).

(14) Remove five rivets and five Huck lockbolts attaching aft end of sequencing shaft upper support to floor beam aft of sequencing shaft (refer to Structural Repair Manual for proper rivet and Huck lockbolt removal procedures).

(15) Remove emergency release sequencing shaft assembly.

F. Install MLG Emergency Release Sequencing Shaft.

(1) Insert lower end of sequencing shaft through hole in top of right-hand main wheel well. Align sequencing shaft upper support and lower bearing housing with attachment holes in airplane. Install six bolts securing sequencing shaft lower bearing housing to top of right-hand main wheel well.

(2) Install five AN470DD6 rivets and five 3/16-inch diameter Huck lockbolts attaching aft end of sequencing shaft upper support to floor beam aft of sequencing shaft (refer to Structural Repair Manual for proper rivet and Huck lockbolt installation procedures).

(3) Install bolt and five AN470AD5 rivets attaching forward end of sequencing shaft upper support to floor beam forward of sequencing shaft. Safety wire retainer nut on sequencing shaft lower bearing housing to structure.

(4) Connect MLG emergency control cable to sequencing shaft upper quadrant and secure with cotter pin.

(5) Wind up temperature compensator spring number of turns recorded in step 1.E.(8) of removal procedure. Retain end of spring with a suitable pin installed through upper hole in temperature compensator cover to prevent spring from unwinding.

(6) Position temperature compensator cover and spring assembly on top of sequencing shaft and hook end of spring over pin on sequencing shaft upper cable quadrant; attach compensator cover to sequencing shaft upper support with five bolts and washers.

(7) Attach spring scale to MLG emergency control cable and check compensator spring and sequencing shaft return spring tension as follows:

(a) Pull MLG emergency control cable and rotate sequencing shaft upper cable quadrant through first 1.3 inches of travel. Force required to rotate quadrant must be seven to eleven pounds, and sequencing shaft upper cam must remain stationary. Adjust temperature compensator spring as required to provide proper spring tension.

(b) Rotate sequencing shaft upper cable quadrant beyond first 1.3 inches of travel. Spring tension must be twelve to sixteen pounds. Adjust sequencing shaft return spring to provide proper spring tension.

(8) Remove spring scale from MLG emergency operating cable.

(9) Connect MLG selector valve vent cable to upper cam follower lever with bolt, washers, and nut. Secure nut with cotter pin.

NOTE: Install bolt with head facing down. Do not tighren nut; bolt must be free to rotate after installation.

(10) Position ground access cable in pulley bracket on sequencing shaft upper support; install cable guards.

(11) Install spacer, cam and lever assembly, MLG up-lock release quadrant, and second spacer on lower end of sequencing shaft; secure with bolt and nut.

(12) Position lower cam follower lever in support bracket and install pivot bolt and nut. Secure nut with cotter pin.

NOTE: Install bolt with head facing down.

(13) Connect MLG up-lock emergency release cables to sequencing shaft lower cable quadrant and secure with cotter pins.

(14) Connect cables to sequencing shaft lower cam follower lever with bolt, washers, spacer, retainer, keeper, and nut. Secure nut with cotter pin.

NOTE: Install bolt with head facing down.

(15) Connect spring between main wheel well bracket and lower cam follower lever.

(16) Rig MLG emergency release system (refer to 32-6-0, steps 1.B.(2), 1.B.(5), 1.B.(8), and 1.C.(6) thru 1.C.(11)).

(17) Install sequencing shaft lower cover and secure with eleven bolts and nuts.

(18) Install passenger cabin floor panels and carpeting (refer to Chapter 53, FUSELAGE, and Chapter 25, EQUIPMENT/FURNISHINGS).

(19) Remove warning tag and close HYD PUMP MOTOR CONT circuit breaker.

(20) Charge No. 2 hydraulic system accumulator with dry filtered air or nitrogen (refer to Chapter 12, SERVICING).

(21) Deleted.

(22) Deleted.

(23) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0).

NOTE: If only the MLG emergency release sequencing shaft has been replaced and no other rigging or adjustment has been changed, operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.G. (excluding NLG checks), 2.H., and 2.I.

(24) Deleted.

NOSE LANDING GEAR (NLG) EMERGENCY LOWERING AND SELECTOR VALVE CONTROL ASSEMBLIES - MAINTENANCE PRACTICES

1. Removal/Installation NLG Emergency Lowering Control Assembly (see Figure 201)

A. General.

The NLG emergency lowering control assembly is located above the nose wheel well at approximately fuselage sta 244. Gain access to the assembly through the left and right electrical equipment "tunnel" compartment doors.

B. Equipment Required - None.

C. Materials Required.

(1) AN426DD6 rivets, as required.

(2) Deleted.

D. Preparation.

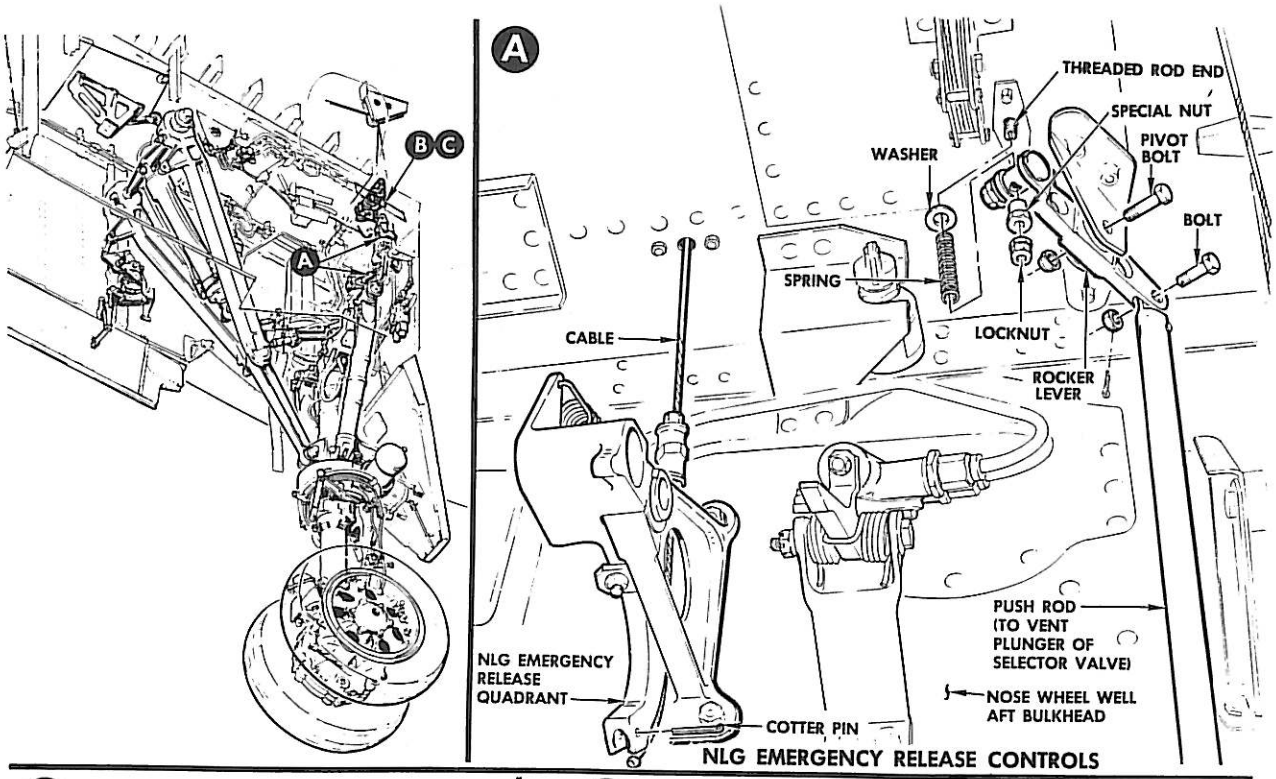
(1) Ascertain that landing gear emergency release lever is in the normal (up) position. Attach warning tag.

(2) Release NLG door ground access latches and open NLG doors (refer to 32-14-0).

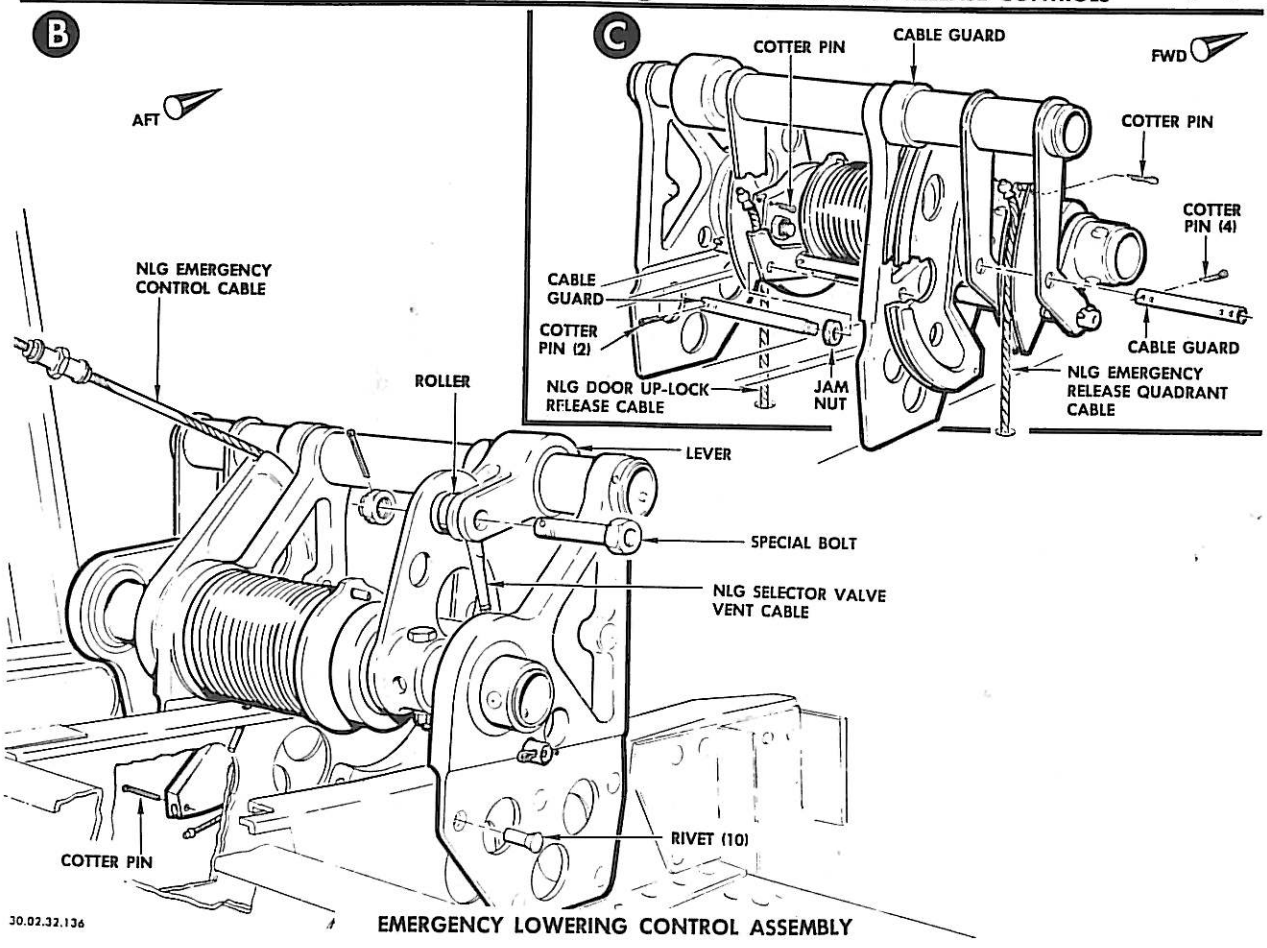
WARNING: WHEN OPERATING LATCH LEVERS, HOLD DOORS AND LOWER THEM SLOWLY TO PREVENT POSSIBLE INJURY TO PERSONNEL.

E. Remove NLG Emergency Lowering Control Assembly.

	Figure Detail
(1) Release tension on control cables connected to the emergency lowering control assembly as follows:	
(a) Back off NLG emergency control cable turnbuckle, above emergency lowering control assembly.	B
(b) Back off NLG door up-lock release cable turnbuckle, in forward left-hand corner of nose wheel well.	
(c) Back off cable turnbuckle above NLG emergency release quadrant, on aft bulkhead of nose wheel well.	A
(d) Remove nuts, spring, and washer attaching threaded rod end of NLG selector valve vent cable to rocker lever in nose wheel well.	A
(2) Remove cotter pins and cable guard at quadrant on right-hand end of emergency lowering control assembly.	C



NLG EMERGENCY RELEASE CONTROLS



EMERGENCY LOWERING CONTROL ASSEMBLY

Nose Landing Gear Emergency Lowering Control Assembly
Installation
Figure 201

	Figure Detail
(3) Remove cotter pins in cable guard at door up-lock release cable quadrant in control assembly. Back off jam nut on right-hand end of cable guard and unscrew cable guard from control assembly support.	C
(4) Deleted.	
(5) Remove cotter pin, nut, roller, and special bolt connecting NLG selector valve vent cable to lever on control assembly upper shaft.	B
(6) Remove cotter pins from control assembly cable quadrants and disconnect cables.	B,C
(7) Remove ten rivets attaching NLG emergency lowering control assembly to top of nose wheel well.	B
(8) Remove NLG emergency lowering control assembly.	

F. Install NLG Emergency Lowering Control Assembly.

(1) Place NLG emergency lowering control assembly in position on top of the nose wheel well and secure to structure with ten AN426DD6 rivets (refer to Structural Repair Manual for proper rivet installation procedure).	B
(2) Connect cables to their respective cable quadrants in control assembly and secure with cotter pins.	B,C
(3) Connect NLG selector valve vent cable to lever on upper shaft of emergency lowering control assembly with special bolt, roller, and nut. Secure nut with cotter pin.	B
(4) Deleted.	
(5) Install door up-lock release cable guard in control assembly and tighten jam nut on right-hand end of cable guard. Secure left-hand end of cable guard to support with cotter pins.	C
(6) Install cable guard at NLG up-lock release quadrant on emergency lowering control assembly; secure cable guard with cotter pins.	C
(7) Install washer, spring, and nuts connecting threaded rod end of NLG selector valve vent cable to rocker lever in nose wheel well.	A
(8) Perform Adjustment/Test Landing Gear Emergency Controls - Rigging and Adjustment (refer to 32-6-0).	

NOTE: If the NLG emergency lowering control assembly only has been replaced and no other rigging or adjustment has been changed, adjustment can be accomplished per 32-6-0, steps 1.B.(2), 1.B.(6), 1.B.(8), and 1.C.(1) thru 1.C.(5)(i). Operation can be checked per 32-0, steps 2.C.(9) thru 2.C.(12), 2.G.(1) thru 2.G.(12) (excluding MLG checks), and 2.I.(1) thru 2.I.(5).

2. Removal/Installation NLG Selector Valve Emergency Control Linkage (see Figure 201)

A. General.

The NLG selector valve emergency control linkage is located at the aft end of the nose wheel well, above the NLG selector valve. Gain access to the linkage through the nose wheel well fairing opening.

B. Equipment Required - None.

C. Preparation. Ensure that landing gear emergency release lever on pilots' pedestal is in the normal (up) position. Attach a warning placard.

D. Remove NLG Selector Valve Emergency Control Linkage.

	Figure Detail
(1) Disconnect push rod on rocker lever at top aft end of nose wheel well by removing cotter pin, nut, and bolt; remove push rod.	A
(2) Remove nuts, spring, and washer attaching threaded rod end of NLG selector valve vent cable to rocker lever.	A
(3) Remove nut and pivot bolt from center of rocker lever; remove lever.	A

E. Install NLG Selector Valve Emergency Control Linkage.

(1) Place rocker lever in mounting bracket in top aft end of nose wheel well. Install pivot bolt and nut.	A
(2) Connect threaded rod end of NLG selector valve vent cable to rocker lever with washer, spring, and nuts.	A
(3) Place push rod in position between NLG selector valve vent spool and rocker lever. Temporarily connect upper end to rocker lever.	A

NOTE: Check that "O" ring seal is installed in lower end of push rod.

(4) Rig NLG selector valve vent cable and push rod (refer to 32-6-0, steps 1.C.(2) and 1.C.(3).

(5) Perform Adjustment/Test Landing Gear System - Operational Check (refer to 32-0).

NOTE: If only the NLG selector valve emergency control linkage has been replaced and no other rigging or adjustment has been changed, operation can be checked per 32-0, steps 2.C.(4) thru 2.C.(13), 2.G.(1) thru 2.G.(12) (excluding MLG checks), and 2.I.(1) thru 2.I.(5).

(6) Secure nut on bolt attaching upper end of push rod to rocker lever with cotter pin.

NOSE WHEEL STEERING SYSTEM - DESCRIPTION AND OPERATION

1. General

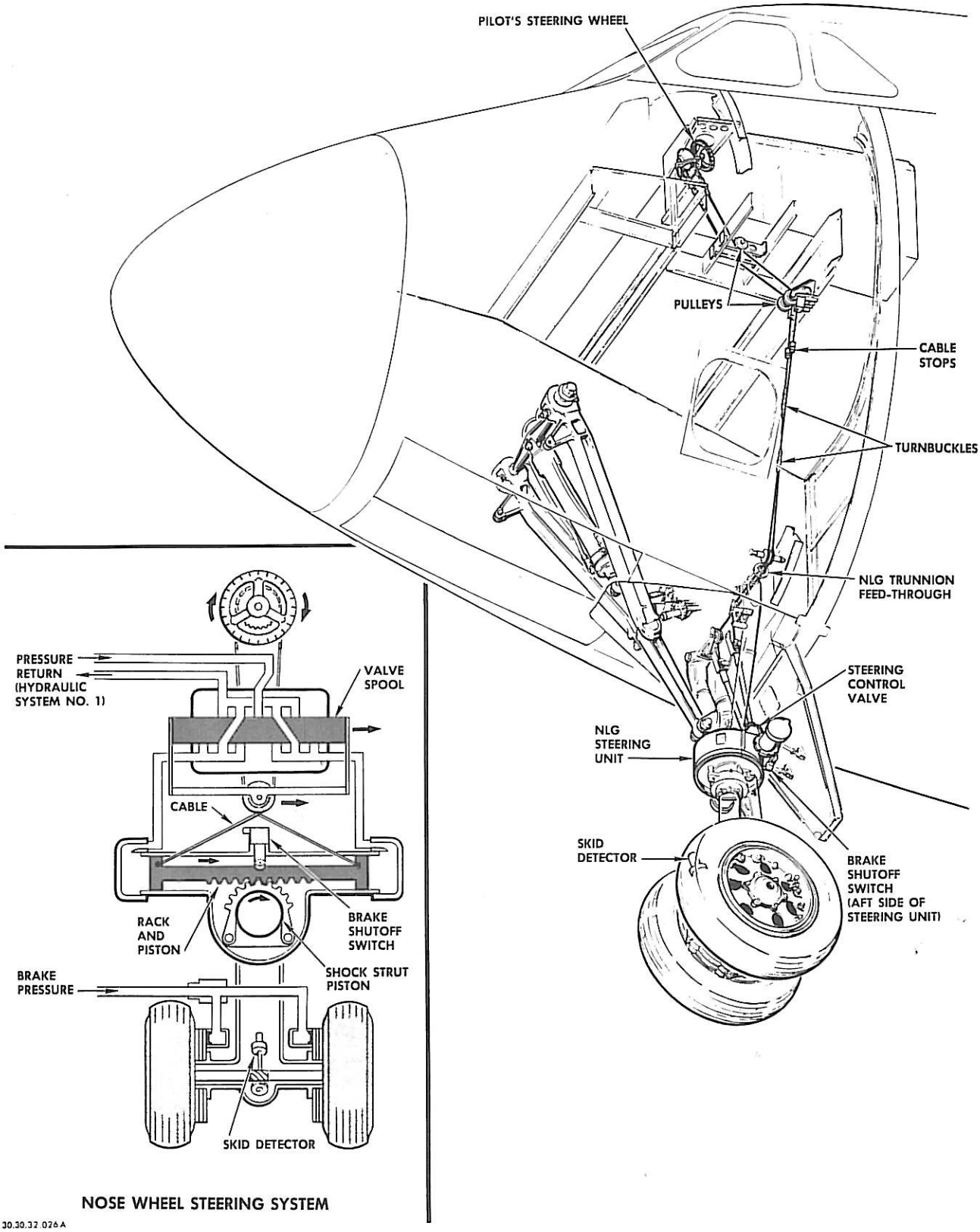
A hydraulically actuated nose wheel steering system, powered by the No. 1 hydraulic system, provides positive airplane directional control during ground operations. The steering system consists of a steering handwheel and sprocket assembly located on the pilot's console panel, a steering unit on the lower end of the NLG shock strut cylinder, and an interconnecting chain and cable system; see Figure 1. See 32-4-0, Figure 1 for a schematic illustration of the nose wheel steering hydraulic system. Adjustable stops on the steering cables limit steering range to 65 degrees (nominal) left and right of center. The steering ratio between the steering handwheel and the nose wheels is 3.03 to 1. An "on-off" switch, located on the hub of the steering handwheel, enables the pilot to lock out the nose wheel brakes. An amber light, also mounted on the steering handwheel hub, illuminates when the nose wheel brakes are locked out. A brake shutoff microswitch on the aft side of the nose wheel steering unit prevents use of the nose wheel brakes when the wheels are turned more than seven degrees from center.

The nose wheel steering unit also incorporates rigging provisions to ensure proper adjustment of the system. Rig pin holes, accessible through a spring-loaded cover on the aft side of the steering unit, are set at 63 degrees left, zero degrees, and 63 degrees right travel. The left and right rig pin holes are used only when checking steering unit backlash; the center hole is used to locate the steering unit neutral position.

2. Operation

Hydraulic pressure to the nose wheel steering system is shut off automatically by the NLG selector valve when the nose landing gear is retracted. Upon gear extension, the NLG selector valve ports hydraulic pressure from the No. 1 hydraulic system to the nose wheel steering unit. The steering unit incorporates a control valve and a hydraulic actuator. The control valve is a sliding spool which directs pressure to the actuator; it is connected by cables to the steering handwheel. When the steering handwheel is turned, the control valve is moved off center. This directs hydraulic pressure to the appropriate side of the actuator. The control valve spool connects to the hydraulic actuator by cables. When the actuator starts moving, it moves the control valve spool by relieving tension on the control cable until the control valve is again centered. This provides an automatic followup, and causes the nose wheels to turn in proportion to the amount the steering handwheel was turned.

The steering unit hydraulic actuator rotates a collar mounted at the base of the shock strut cylinder through a rack and pinion. The upper torque arm connects to the collar. When the collar rotates, the torque arms transmit the steering movements to the shock strut piston and on to the wheels. In the event of hydraulic pressure loss to the nose wheel steering unit, the airplane can be steered by differential braking of the main gear.



NOSE WHEEL STEERING SYSTEM

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NOSE WHEEL STEERING SYSTEM - TROUBLE SHOOTING

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. NOSE WHEEL STEERING INOPERATIVE OR ERRATIC	
A. Loss of hydraulic pressure.	Check No. 1 hydraulic pressure indicator. If no hydraulic pressure is indicated, refer to Chapter 29, HYDRAULIC POWER.
B. Control cable off pulley.	Check routing of control cables. If cable is off pulley, replace in proper position and check for proper tension.
C. Nose wheel steering actuator malfunctioning.	Remove and replace the nose wheel steering unit if the above steps do not correct the trouble.
2. NOSE WHEEL STEERING SLOW OR SLUGGISH	
A. Pressure filter clogged.	Check pressure filter at nose wheel steering control valve for cleanliness. If dirt is present, clean or replace filter.
3. NOSE WHEEL STEERING CONTROL WHEEL HARD TO TURN	
A. Incorrect cable tension.	Check control cable tension and adjust if necessary
B. Pulleys not properly aligned.	Check pulleys for proper alignment and rotation. If not satisfactory, replace pulley.
C. Pulley bracket not pivoting properly.	Check pivoting of pulley bracket. If not satisfactory, lubricate yoke pin through lubricator. Check yoke pivot pin and bushing for wear and replace if necessary.
D. Nose wheel steering actuator assembly malfunctioning	Remove and replace the nose wheel steering unit if the above steps did not correct the trouble.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
4. EXCESSIVE PLAY IN STEERING CONTROLS	
A. Improper cable tension.	Check tension of control cables and adjust if necessary.
B. Backlash not properly adjusted	Check backlash between piston rack and pinion of steering unit (refer to adjustment/test nose wheel steering). Adjust if not within tolerance.
5. NOSE WHEEL SHIMMY	
A. Nose wheel tires wearing unevenly or improper inflation.	Visually inspect nose wheel tires for flat spots or uneven wear. Check tire pressure. If tires are worn unevenly, remove and replace. Reservice tires if pressure is not correct.
B. Excessive play in torque arms, drag brace, or side braces.	Check torque arms, drag brace, and side braces for wear and excessive play by visual inspection and attempting to move these units.
C. Backlash not properly adjusted.	Check backlash between piston rack and pinion of steering unit (refer to adjustment/test nose wheel steering). Adjust if not within tolerance.
6. HYDRAULIC FLUID LEAKAGE	
A. Loose fitting of connector.	Check all fittings and connectors and tighten if loose.
B. Cracked sleeve on hydraulic line.	If leak is coming from a connector or fitting and connector or fitting is tight, check for cracked sleeve. Install new line, if sleeve is cracked.
C. Damaged or deteriorated "O" ring seals.	If leak is at point where "O" ring seals are used, check "O" ring seals for nicks, cuts, or deterioration. Install a new "O" ring seal if seal is damaged or deteriorated. If nose wheel steering control valve is leaking, remove and replace the nose wheel steering actuator assembly.

NOSE WHEEL STEERING SYSTEM - MAINTENANCE PRACTICES

1. Adjustment/Test Nose Wheel Steering System

A. Equipment Required.

(1) Hydraulic test unit (Skydrol 500A hydraulic fluid) capable of delivering up to 3000 psig.

(2) Cable tensiometer.

(3) A torque device for measuring and exerting a steady rotary (clockwise and counterclockwise) force on the rim of the nose wheel steering handwheel.

(4) A protractor, calibrated from 0 to 80 degrees in each direction, for measuring the position of the nose wheels.

(5) Rigging pin, National Water Lift Co., No. 125088 or equivalent.

(6) Turn table capable of supporting nose of airplane, to allow nose wheels to turn without scuffing tires.

(7) Two hydraulic pressure test gages (0 to 3000 psig minimum) to measure pressure at the cylinder pressure ports on the steering unit control valve.

(8) Dial indicator to measure backlash.

(9) Torque wrench.

(10) Stop watch.

(11) Airplane nose jacking equipment.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Check that ground safety pins are installed in nose and main landing gear.

(3) Check that NLG shock strut is properly serviced (refer to Chapter 12, SERVICING).

(4) Check nose landing gear tire pressure (refer to Chapter 12, SERVICING).

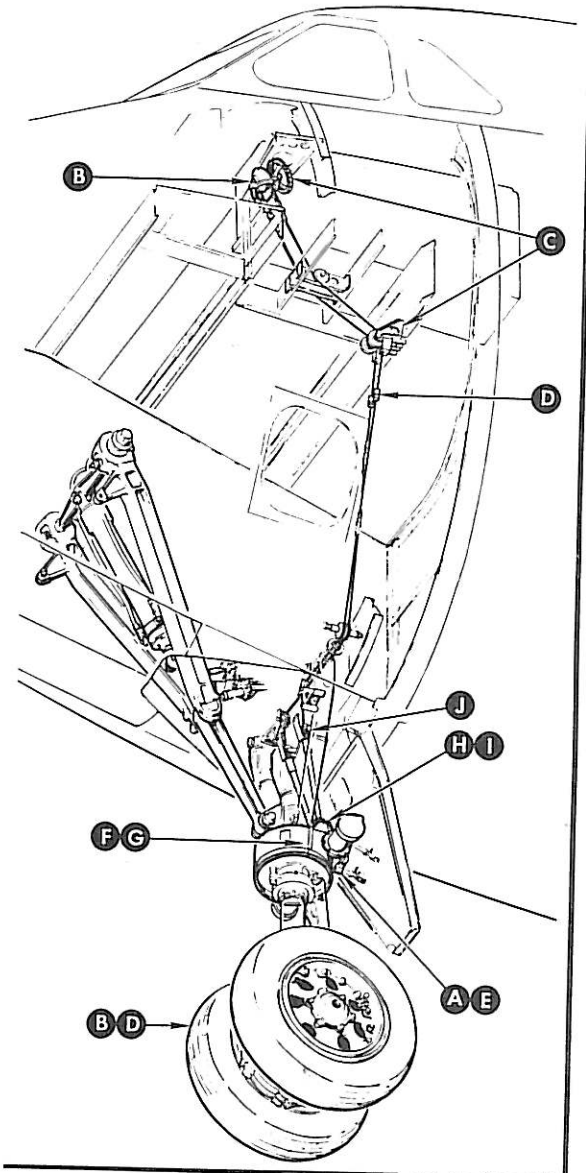
(5) Install protractor on the nose landing gear.

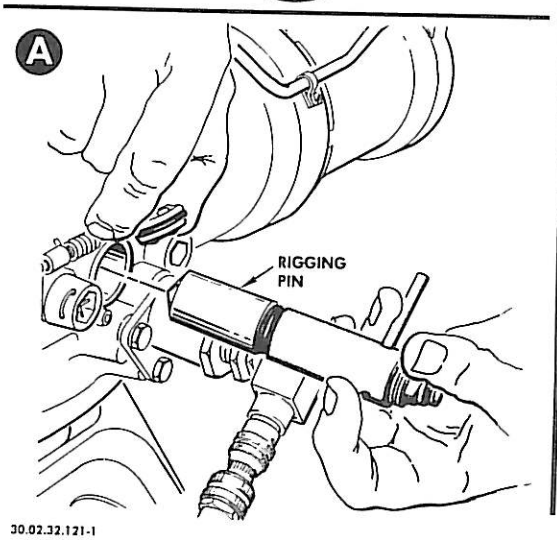
(6) Install turn table under nose wheels and allow nose wheels to rest on turn table.

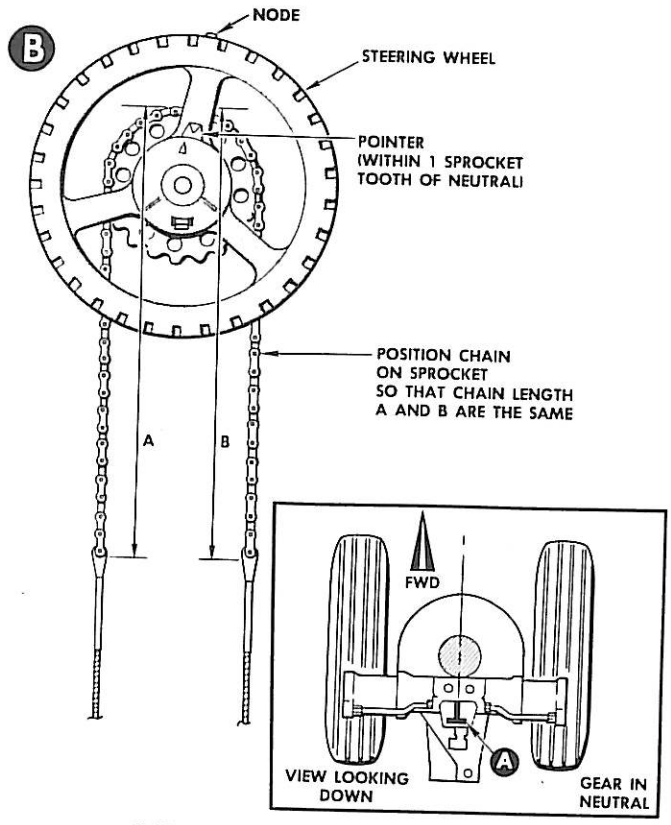
(7) Check that all cable guards are correctly installed and that cables are in pulley grooves.

C. Preliminary Check - Cable Rigging (see Figure 201).

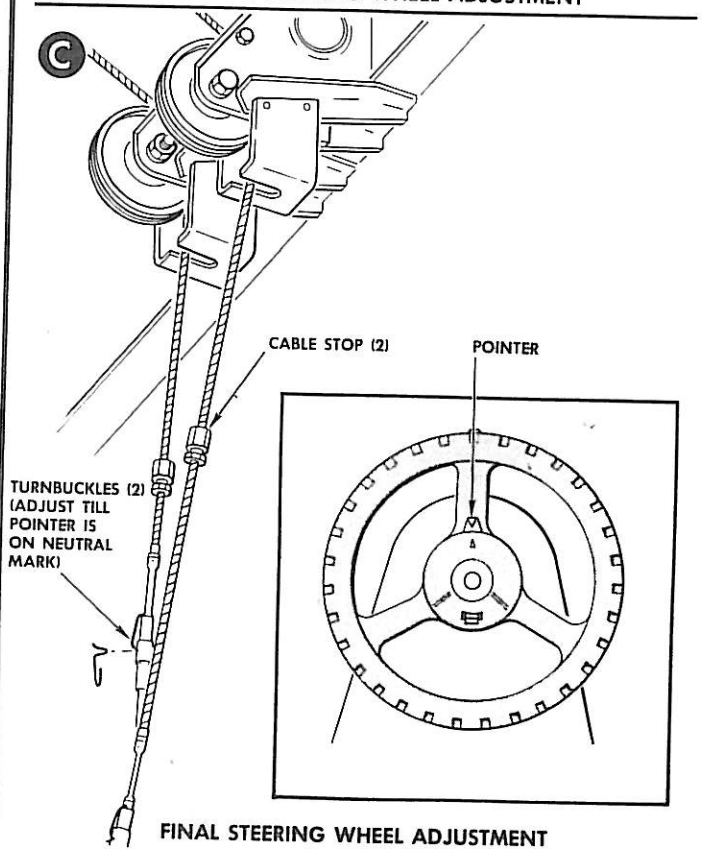
	Figure Detail
(1) Check that cable seals are properly installed in the upper ends of the steering control cable tubes.	J
(2) Insert rigging pin (National Water Lift Co., No. 125088) in center hole of steering unit.	A,E
NOTE: Rigging pin holes are set 63 degrees left, 0 degrees, and 63 degrees right. Only the 0-degree (neutral) rigging pin hole will be used to rig the nose wheel steering.	
(3) Position the steering handwheel at NEUTRAL. Handwheel spoke and node on rim of handwheel shall align with indicator. Adjust chain so that end terminals are same distance from sprocket (± one sprocket tooth).	B
(4) Adjust cable turnbuckles to center steering handwheel pointer on NEUTRAL mark. Adjust tension of inboard and outboard steering cables to 35 (± 5) pounds at 70 degrees F. Temperature conversion rate is 0.25 pound per degree F (0.50 pound per degree C). Safety turnbuckles after adjustment.	C
NOTE: Check cable tension at two places on each cable when making adjustments. The average reading shall meet required value.	
(5) Loosen cable stops.	C
(6) Remove rigging pin and manually rotate gear to full left-hand mechanical stop. Turn nose wheels 1/2 degree toward neutral. If protractor reads more than 65 degrees, back off to 65 degrees and set cable stop.	A,D
(7) Manually rotate gear to full right-hand mechanical stop. Turn nose wheels 1/2 degree toward neutral. If protractor reads more than 65 degrees, back off to 65 degrees and set cable stop.	D



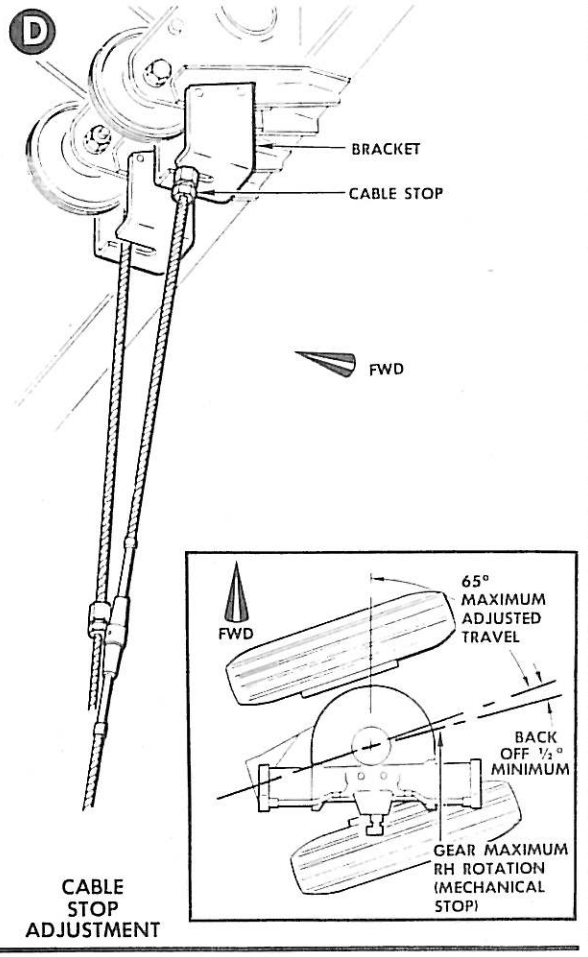




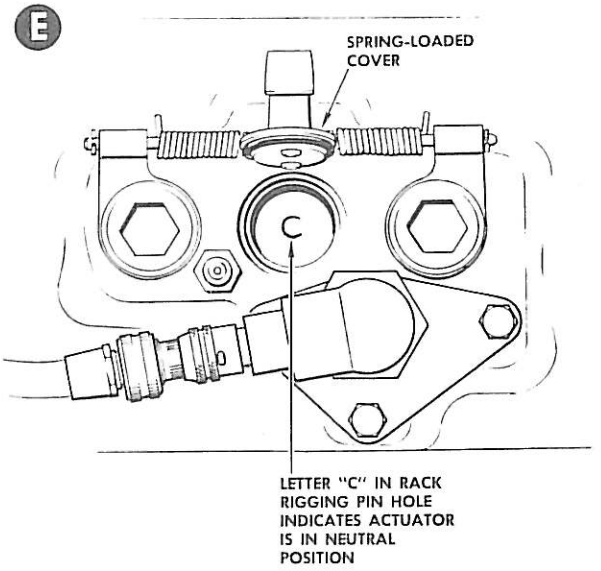
INITIAL STEERING WHEEL ADJUSTMENT

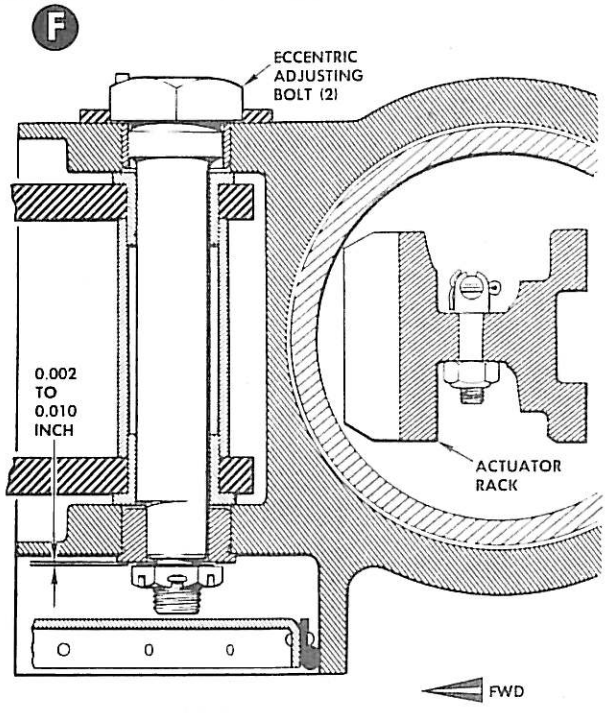


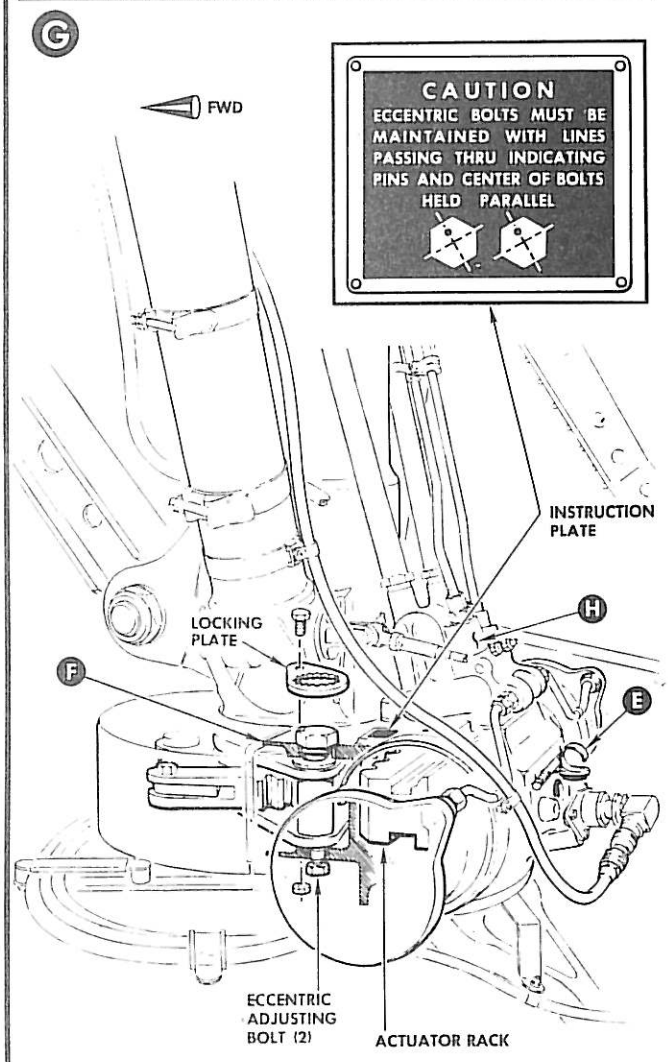
FINAL STEERING WHEEL ADJUSTMENT



CABLE STOP ADJUSTMENT







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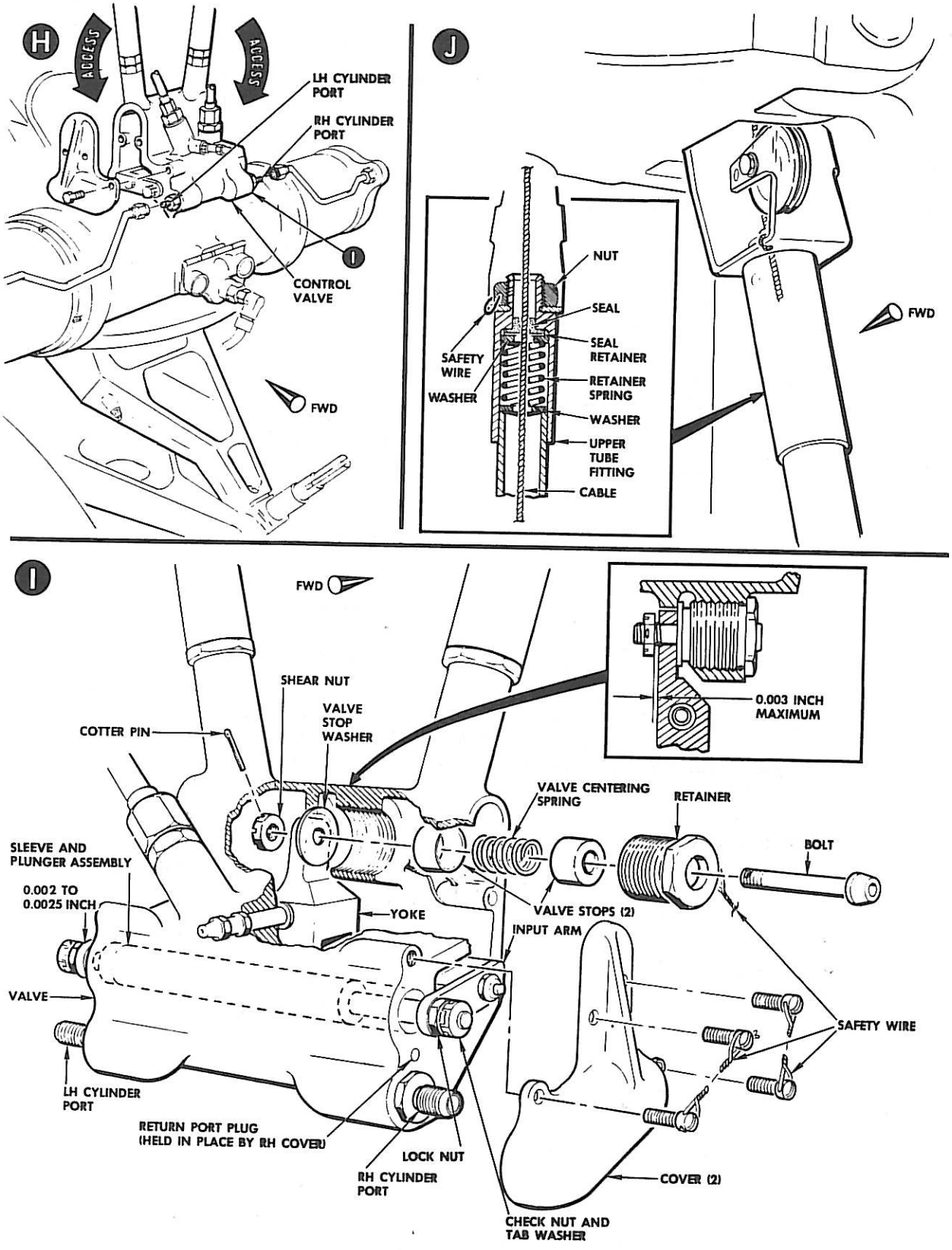

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CENTERING SPRING AND CONTROL VALVE ADJUSTMENT

Figure Detail

(8) Manually rotate nose gear to 0 degrees and insert rigging pin. Rigging pin shall slip in easily and without bind. Steering handwheel shall be at NEUTRAL. — A,E

(9) Remove rigging pin. — A

D. Operational Check.

(1) Install torque device on the steering handwheel in the flight compartment.

(2) Pressurize hydraulic system No. 1 (refer to Chapter 29, HYDRAULIC POWER).

NOTE: The landing gear control lever must be in the DOWN position to hydraulically operate the nose wheel steering.

(3) Cycle nose wheel steering 10 times to bleed air from system.

(4) Turn steering handwheel full left. Torque required to turn handwheel full left shall be 28 (±4) inch-pounds. Maximum gear travel shall be 65 degrees.

(5) Turn steering handwheel full right. Torque required to turn handwheel full right shall be 28 (±4) inch-pounds. Maximum gear travel shall be 65 degrees.

(6) Raise landing gear control lever to NEUTRAL and rotate steering handwheel to left and right. Nose wheels shall not move. Return landing gear control lever to DOWN.

NOTE: The manual override lever at the base of the landing gear control lever must be actuated to permit moving the control lever from the DOWN position.

(7) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(8) Disconnect nose landing gear brake line, skid detector harness and torque arms at quick-disconnects. Nose wheels shall free castor 360 degrees.

Figure
Detail

(9) Reconnect brake line and skid detector harness; leave torque arms disconnected for steering unit backlash check.

E. Steering Unit Backlash Check.

(1) Remove fiberglas housing around forward side of strut (refer to 32-7-1).

(2) With torque arms disconnected, rotate nose landing gear to right-hand rigging pin hole location. Insert rigging pin (National Water Lift Co., No. 125088). A

(3) Apply 1000 psig hydraulic pressure to one side of steering cylinder.

WARNING: DO NOT EXCEED 1500 PSIG HYDRAULIC PRESSURE UNDER ANY CIRCUMSTANCES.

(4) Set dial indicator tangent to pitch radius of end tooth of steering pinion. G

(5) Twist nose landing gear upper torque arm to left and right. Total backlash travel shall be 0.001 to 0.009 inch as read on dial indicator.

(6) If travel does not meet tolerance, adjust steering unit eccentric adjusting bolts. F,G

NOTE: The instructions contained on the nameplate adjacent to the eccentric bolts regarding their adjustment must be complied with.

(7) Repeat steps (1) through (6) except with gear rotated to the left-hand rigging pin hole.

(8) Repeat steps (1) through (6) except with gear rotated to center rigging pin hole.

(9) Remove rigging pin, hydraulic power, and reconnect nose landing gear torque arms.

F. Final Operational Check.

(1) Jack airplane at fuselage nose jack point until nose landing gear wheels clear the ground (refer to Chapter 7, LIFTING AND SHORING).

Figure Detail

(2) With nose wheels centered, inflate NLG shock strut to 177 psig with dry filtered air or nitrogen.

CAUTION: PRIOR TO ACCOMPLISHING STEP (3), FOLLOWING, TIE DOWN NOSE OF AIRPLANE TO PREVENT LIFTING OFF OF NOSE JACK.

(3) Place turntable and jack beneath nose wheels, and raise nose wheels until strut is compressed 1.5 inches minimum.

(4) Pressurize hydraulic system No. 1 (refer to Chapter 29, HYDRAULIC POWER).

(5) With torque arms connected, steer nose wheels 20 degrees to the right and hold.

(a) Slowly lower jack beneath nose wheels and allow strut to rest on centering cams.

(b) Remove nose wheel jack and turntable.

(6) Release steering handwheel and allow strut centering cams to move wheels to the neutral position. The nose wheels shall move from 20 degrees to neutral (± one degree) in 11 seconds or less.

(7) Repeat steps (3), (5), and (6) for left turn.

(8) If the above requirements are not met, reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING) and adjust the nose wheel steering control valve as follows:

(a) Centering Adjustment.

1) Remove tension in steering control cables at turnbuckles. C

CAUTION: DO NOT OPERATE UNIT WITH CABLES SLACK.

2) Remove valve covers and check that valve centering stops are installed with valve stop washer against yoke, and valve stop, valve centering spring, valve stop, and retainer following in that order. H,I

NOTE: Fill centering spring cavity with grease, Specification MIL-G-3278.

	Figure Detail
3) Torque valve stops retainer to 30 inch-pounds and safety-wire.	I
4) Insert internal wrenching bolt through the valve centering stops, valve stop washer, and yoke.	I
5) Install shear nut and torque nut until firmly seated. Back off shear nut until free and then torque nut until contact is made with bearing surface.	I
CAUTION: DO NOT TORQUE NUT BEYOND SURFACE CONTACT.	
6) Back shear nut off to nearest slot and install cotter pin.	I
NOTE: If clearance between shear nut and bearing surface exceeds 0.003 inch, tighten nut one slot and secure.	
7) Rig nose wheel steering control cables per steps C. (1) through C. (9).	

(b) Control Valve Plunger Adjustment.

1) Disconnect hydraulic tubing from control valve cylinder ports and attach a hydraulic pressure test gage to each port.	H
2) Pressurize hydraulic system No. 1 (refer to Chapter 29, HYDRAULIC POWER).	
CAUTION: THE RIGHT-HAND VALVE COVER MUST BE INSTALLED WHEN HYDRAULIC SYSTEM IS PRESSURIZED TO PREVENT RETURN PORT PLUG IN CONTROL VALVE FROM BEING BLOWN OUT.	I
3) Adjust valve plunger till equal plunger displacement is obtained, right or left, to gain system pressure readings on cylinder port gages. Difference between right and left plunger travel shall not exceed 0.003 inch (use dial indicator).	

	Figure Detail
4) Secure valve plunger maintaining 0.002 to 0.0025 inch clearance between special lock nut and mating surface of input arm.	I
5) Check valve plunger for 360 degrees free rotation. If plunger has sticky spots, check contact surfaces of special lock nuts and input arms for burrs or nicks. Remove any burrs or nicks and polish as required. If adjustment was disturbed, readjust per preceding step.	I
6) Check inside surface of valve covers for evidence of interference with input arms. If interference is evident, the input arms may be reworked by chamfering the forward outboard edge of arms 0.140 inch by 45 degrees with 0.03 to 0.06 inch radius. Brush alodine reworked area.	I
7) Install valve covers and safety-wire attach screws.	H,I

(9) Repeat steps (3) through (7). Failure of unit to meet requirements after adjustment shall be cause for unit rejection.

(10) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(11) Remove test equipment and restore airplane to normal configuration.

(12) Service NLG shock strut with clean hydraulic fluid and dry filtered air or nitrogen (refer to Chapter 12, SERVICING).

NOSE WHEEL STEERING UNIT - MAINTENANCE PRACTICES

1. Servicing Nose Wheel Steering Unit (refer to Chapter 12, SERVICING)

2. Removal/Installation Nose Wheel Steering Unit (see Figure 201)

A. Equipment Required.

(1) Steering Unit rigging pin, National Waterlift Co., No. 125088 or equivalent.

(2) Skydrol 500 resistant nose wheel protective cover.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Open and attach warning tags to the following circuit breakers, on main circuit breaker panel:

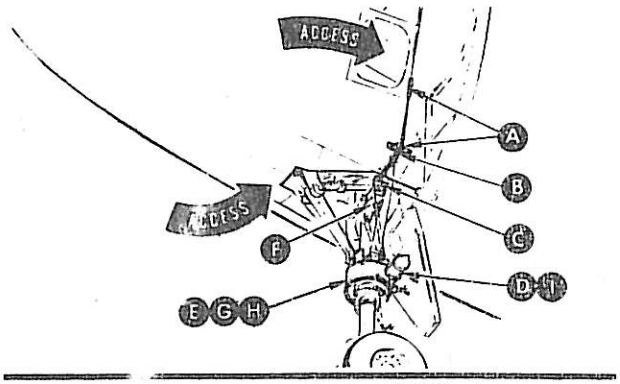
HYD PUMP MOTOR CONT.

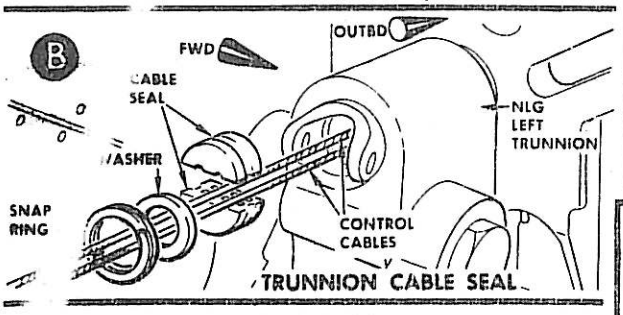
ANTI-SKID NOSE POWER, and WARN.

(3) Place Skydrol 500 resistant protective cover over nose wheel tires.

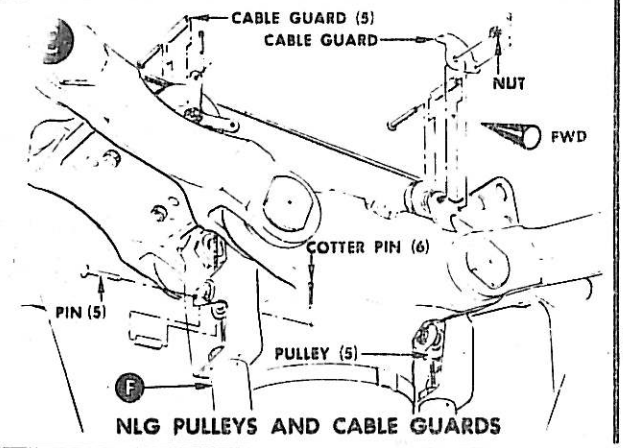
C. Remove Nose Wheel Steering Unit.

	Figure Detail
(1) Disconnect control cables at turnbuckles in the left electrical "tunnel" compartment.	A
(2) Remove cotter pins and remove the two cable guards from the pulley installation adjacent to the NLG left trunnion in left electrical "tunnel" compartment.	A
(3) Remove cotter pins and cable guards from pulley installation at upper left side of shock strut.	C
(4) Remove cotter pins, nut, and cable guards from pulley installation at upper right side of shock strut.	C
(5) Remove cotter pins and cable guards from pulley installations just above the left and right cable tubes on shock strut.	C
(6) Remove snap ring, washer, and split cable seal from NLG left trunnion. Pull steering cables through trunnion pin and pulley installations up to the point where the cables enter the cable tubes.	B

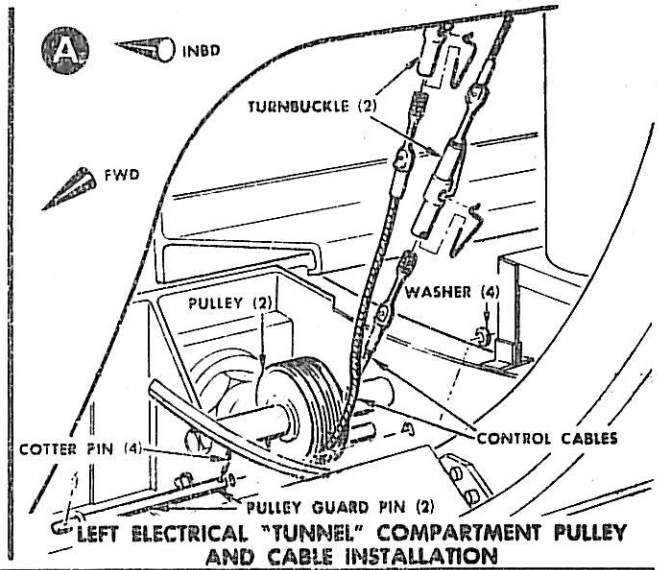




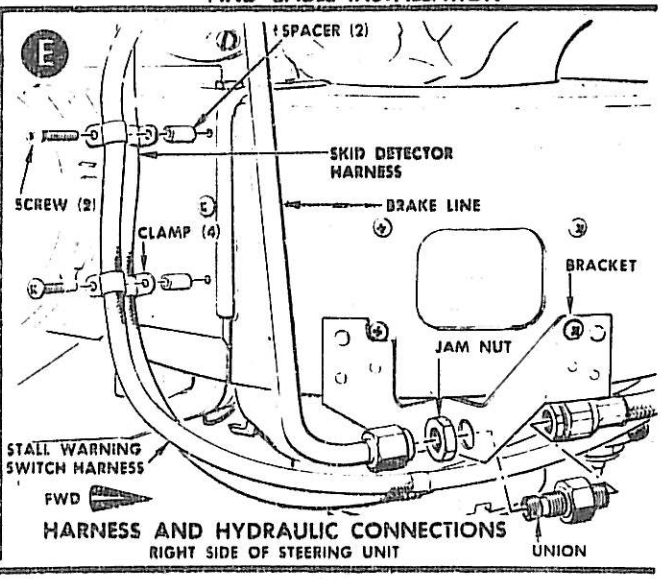
B TRUNNION CABLE SEAL



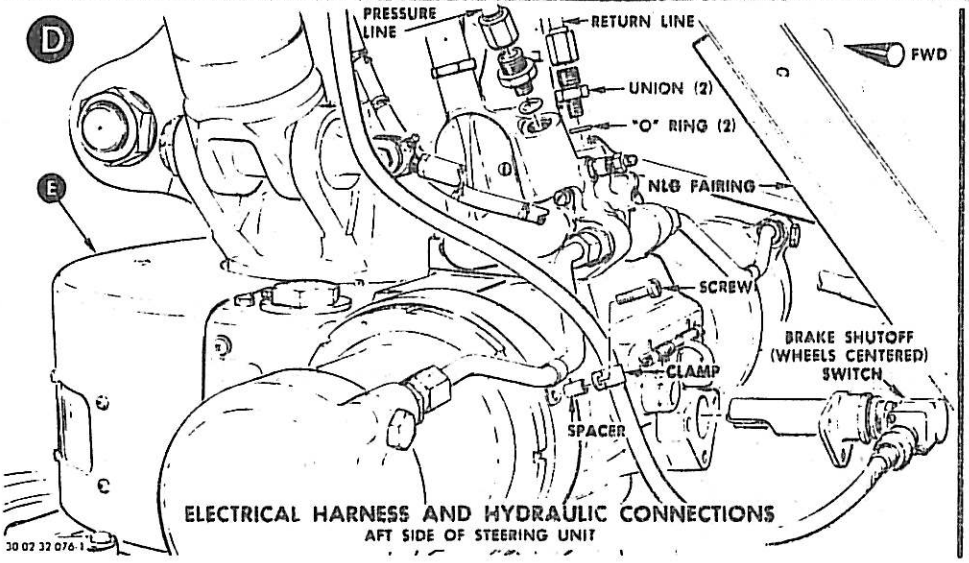
NLG PULLEYS AND CABLE GUARDS



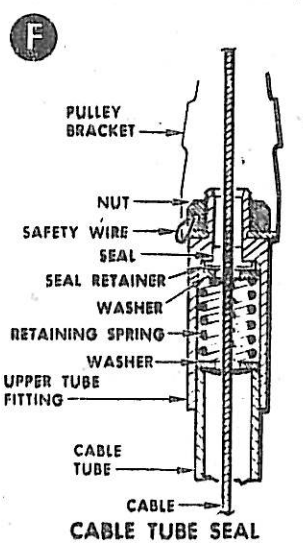
A LEFT ELECTRICAL "TUNNEL" COMPARTMENT PULLEY AND CABLE INSTALLATION



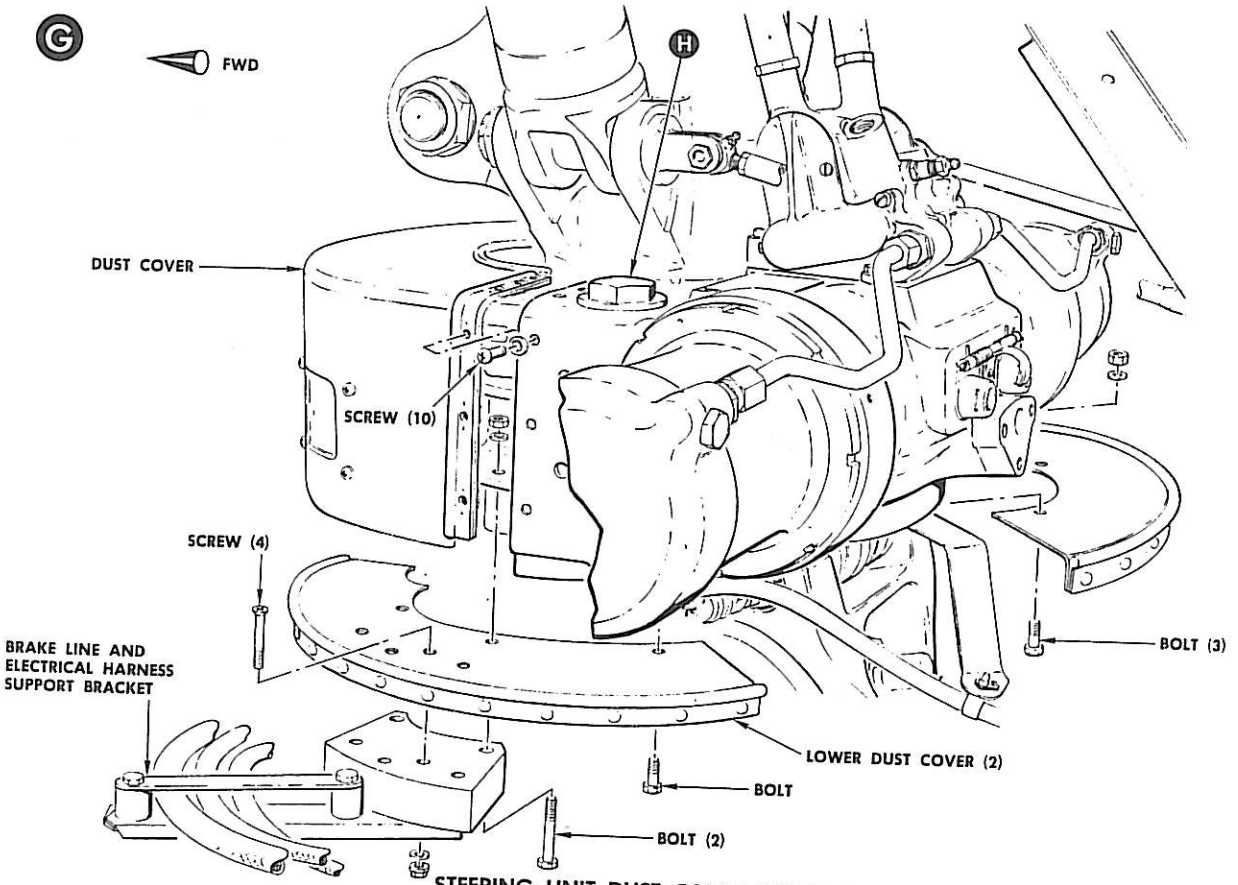
HARNESS AND HYDRAULIC CONNECTIONS
RIGHT SIDE OF STEERING UNIT



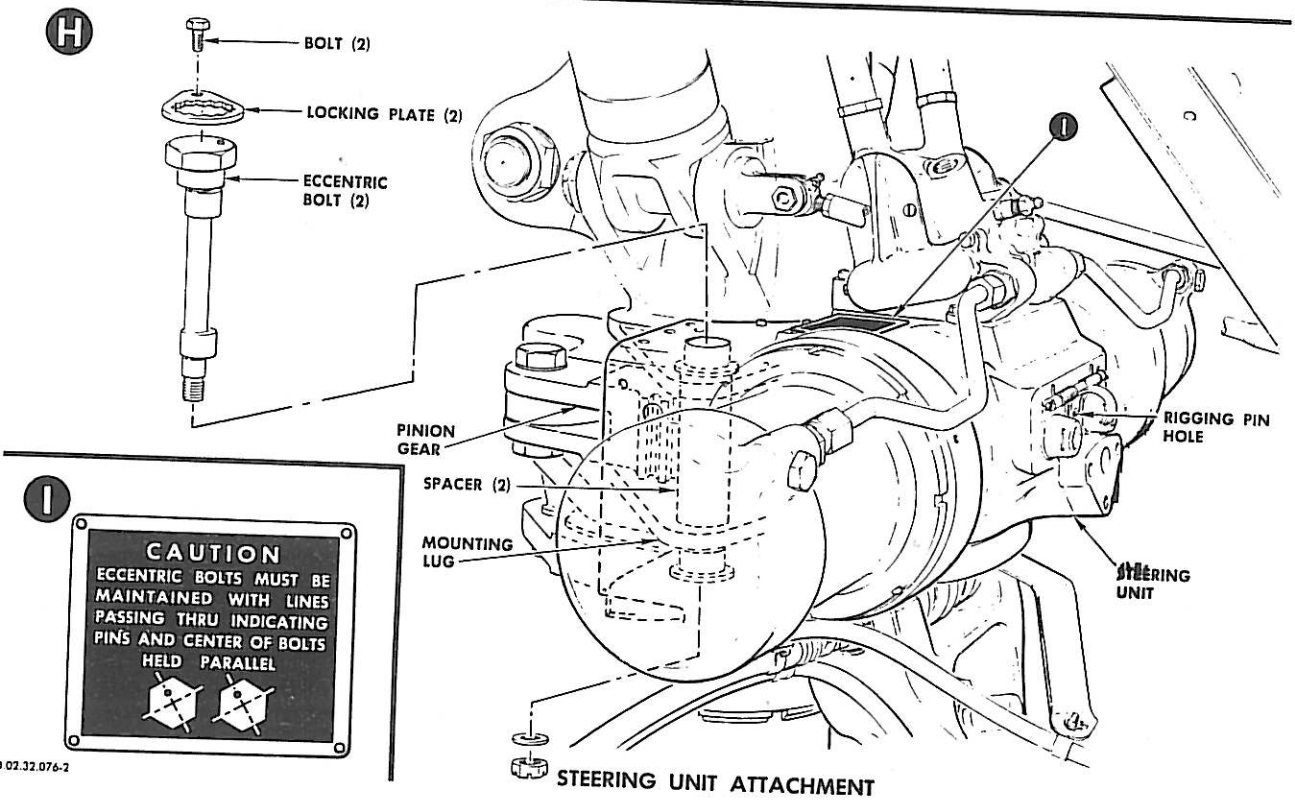
ELECTRICAL HARNESS AND HYDRAULIC CONNECTIONS
AFT SIDE OF STEERING UNIT



CABLE TUBE SEAL



STEERING UNIT DUST COVER INSTALLATION



STEERING UNIT ATTACHMENT

	Figure Detail
(7) Cut safety wire and remove nuts from upper ends of the cable tubes.	C,F
(8) Disconnect electrical harness from brake shutoff switch and remove switch and adapter assembly from steering unit (refer to 32-8-13). Disconnect harness clamp from left side of steering unit.	D
(9) Disconnect brake line from union and bracket at right side of steering unit dust cover.	E
(10) Disconnect electrical harness clamps at right side of steering unit dust cover and tie electrical harnesses clear of steering unit.	E
(11) Remove clamps attaching steering unit hydraulic lines to right-hand cable tube.	D
(12) Identify and disconnect hydraulic lines from steering unit control valve.	D
(13) Remove twelve screws and washers attaching dust cover to steering unit; remove dust cover.	G
(14) Remove four countersunk screws, washers, and nuts attaching brake line and electrical harness support bracket to lower dust cover.	G
(15) Remove six bolts, washers, and nuts securing lower dust cover and the brake line and electrical harness support bracket to NLG shock strut; remove lower dust cover.	G
NOTE: It is not necessary to completely remove the brake line and electrical harness support bracket, nor to disconnect the electrical harnesses routed through the support bracket.	
(16) Remove locking plates from heads of eccentric bolts that attach steering unit to shock strut.	H
(17) Support steering unit and remove cotter pins, washers, nuts, and eccentric bolts; remove steering unit from NLG shock strut.	H
NOTE: When removing steering unit, the two control cable tubes will remain intact with the unit. The upper portion of the tubes contain seals and retainers, and are spring loaded. When pulling the cables through the tube mounting bracket, do not loose the end caps, springs, seals, and retainers. Remove fittings from ports of steering unit control valve and hold for installation on replacement unit; discard "O" rings.	F,G

	Figure Detail
D. Install Nose Wheel Steering Unit.	
(1) Install fittings in ports of replacement steering unit. Use new "O" rings for installation. ("O" rings must be soaked in Skydrol 500A hydraulic fluid prior to installation.)	E
(2) Check that steering unit is in neutral position (letter "C" visible in rigging pin hole) and install rigging pin.	
(3) Install seals, retainers, springs, washers, and end caps on upper ends of the steering unit cable tubes; insert threaded end of tubes through tube mounting brackets on NLG shock strut.	F
(4) Align steering unit with mounting lugs on NLG shock strut and install eccentric bolts, washers, and nuts. Adjust nuts to provide 0.002 to 0.010 inch clearance between nut and steering cylinder bushing (see 32-7-0, Figure 201, Detail F), and secure with cotter pins.	H
NOTE: When installing eccentric bolts, follow the instructions on placard at top left side of steering unit, to keep the indicating pins on bolts in a parallel plane.	I
(5) Adjust steering unit backlash (refer to 32-7-0, step 1.E.) and install eccentric bolt locking plates.	H
(6) Install nuts securing upper ends of the cable tubes to mounting brackets on shock strut. Safety-wire nuts after installation.	C,F
(7) Position lower dust cover left and right halves under shock strut flange, below steering unit, and secure to flange with bolts and nuts.	G
(8) Install bolts, countersunk screws, washers, and nuts attaching brake line and electrical harness support bracket to lower dust cover.	G
(9) Connect hydraulic lines (as identified in step C.(12)) to ports of steering unit control valve and install clamps securing lines to right-hand cable tube.	D
(10) Install brake shutoff switch and adapter assembly on aft side of steering unit (refer to 32-8-13). Connect electrical harness to switch and install harness clamp at left side of steering unit.	D

	Figure Detail
(11) Route the steering unit control cables over their respective pulleys, through the NLG left trunnion and into the left electrical "tunnel" compartment.	A,B,C
NOTE: Place snap ring and washer on cables prior to inserting cables through NLG left trunnion.	
(12) Connect cables at turnbuckles in left electrical "tunnel" compartment.	A
(13) Install cable guards at the following pulley installations.	
(a) Pulley installations just above the left and right cable tubes on shock strut.	C
(b) Upper pulley installation at left and right side of shock strut.	C
(c) Pulley installation in the left electrical "tunnel" compartment.	A
(14) Install split cable seal on steering cables, inboard of NLG left trunnion pin. Safety-wire seal halves together with approximately five turns of safety wire and twist ends together so that no part of the safety wire extends beyond outside diameter of seal. Insert seal into NLG left trunnion pin and secure with washer and snap ring.	B
(15) Remove warning tags and close circuit breakers opened in step B.	
(16) Perform Adjustment/Test Nose Wheel Steering System (refer to 32-7-0, steps 1.B. thru 1.F.(9)).	
(17) Install steering unit dust cover and secure with twelve screws and washers.	G
(18) Install electrical harness clamps at right side of steering unit dust cover.	E
(19) Connect brake line to union at right side of steering unit dust cover.	E
(20) Adjust nose wheel brake shutoff switch (refer to 32-8-13, steps 2.B. and 2.C. thru 2.C.(4)).	
(21) Deleted.	
(22) Check nose wheel brake shutoff switch operation (refer to 32-8-0, steps 4.B.(3), 4.B.(11) thru 4.B.(15), 4.C.(9) thru 4.C.(12), 4.D.(1), 4.D.(2), 4.D.(5), and 4.D.(7)).	

NOSE WHEEL STEERING CABLES AND CONTROL WHEEL - MAINTENANCE PRACTICES

1. Removal/Installation Nose Wheel Steering Cables and Control Wheel (see Figure 201)

A. General.

The nose wheel steering control wheel assembly is mounted on the forward section of the pilot's left console. Gain access to the control wheel assembly mounting bolt nuts (under the console), and the control cables and chain through the left electrical "tunnel" compartment door.

B. Equipment Required - None.

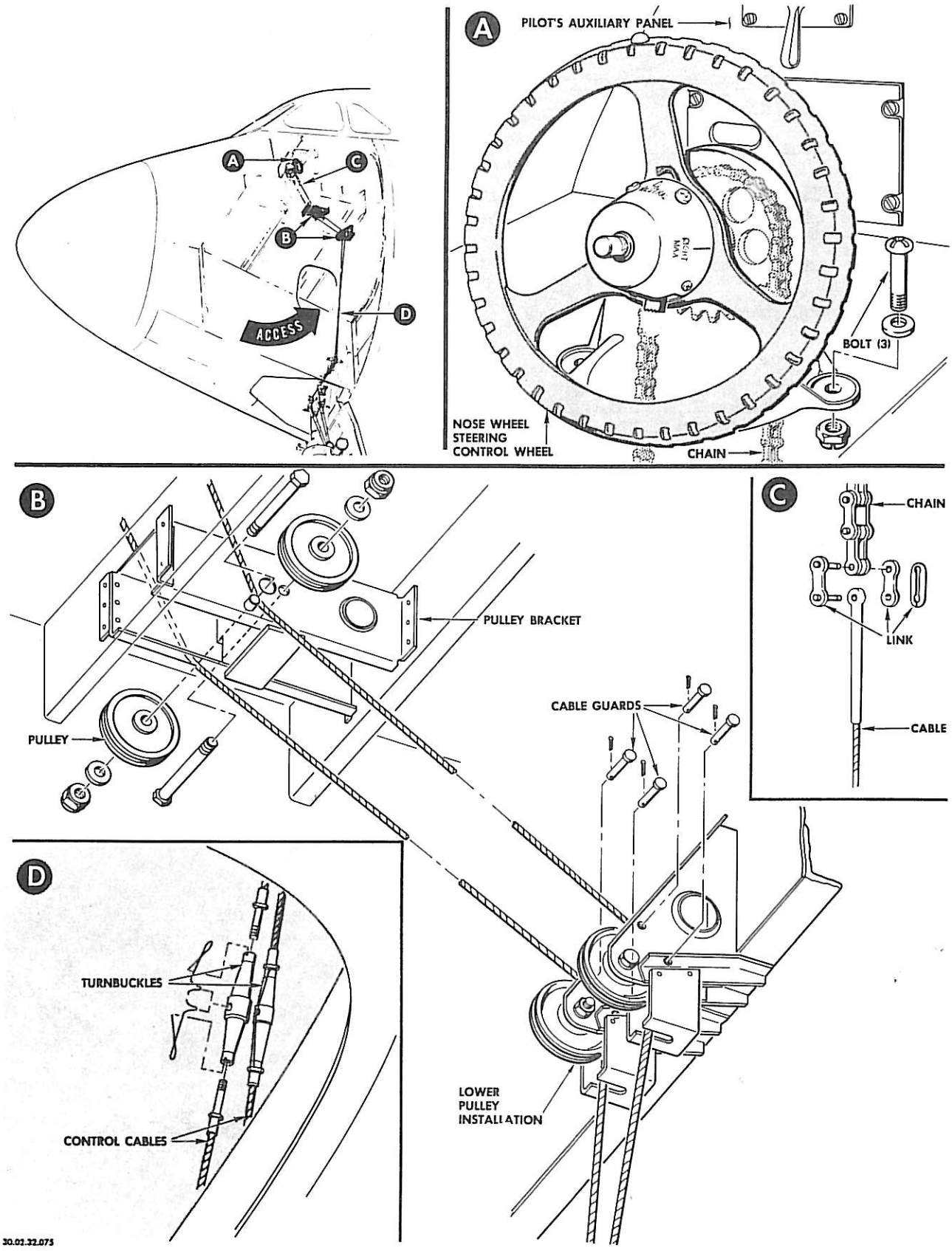
C. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Open and attach warning tag to ANTI-SKID NOSE POWER circuit breaker, on main circuit breaker panel.

D. Remove Nose Wheel Steering Cables and Control Wheel.

	Figure Detail
(1) Gain access to nose wheel brake control switch harness in left electrical "tunnel" compartment. Identify and disconnect wires at permanent splices.	
(2) Disconnect the two control cables at turnbuckles in left electrical "tunnel" compartment.	D
(3) Remove two bolts, washers, and nuts from the upper pulley bracket installation and remove both pulleys.	B
(4) Remove cotter pins from the two cable guards on the lower pulley installation (mounted on forward side of the electrical "tunnel" compartment aft bulkhead) and remove cable guards.	B
(5) Remove two chain links (one on each control cable end fitting) and disconnect the upper control cables from the chain on control wheel assembly. Remove both control cables.	C
(6) Pull wires to brake control switch and warning light through hole in pilot's console.	



Nose Wheel Steering Cables and Control Wheel Installation
Figure 201

Figure Detail

(7) Remove three bolts, washers, and nuts securing the control wheel assembly to the pilot's console and remove the assembly. — A

NOTE: Removal of the lower control cables requires disassembly of the steering actuator (refer to 32-7-1 for removal/installation of the steering actuator).

E. Install Nose Wheel Steering Cables and Control Wheel.

(1) Position the Control wheel assembly on the pilot's left console with the drive chain inserted through slot in console. Secure the control wheel with three mounting bolts, washers, and nuts. (Install bolts with bolt heads up.) — A

(2) Connect the upper control cables to the lower control cables at turnbuckles in the left electrical "tunnel" compartment. (Do not safety turnbuckles at this time.) — D

(3) Route the upper control cables from the connection at the turnbuckles, over the pulleys on the lower pulley installation and over the cable guards on the upper pulley installation. — B

(4) Install pulley guards on lower pulley installation and secure with cotter pins. — B

(5) Install pulleys on upper pulley installation and secure with mounting bolts, washers, and nuts. — B

(6) Connect the control cables to the drive chain on the control wheel assembly. Secure chains to cable end fittings with chain links. — C

NOTE: Node on rim of control wheel shall be up.

(7) Route the nose wheel brake control switch and warning light electrical harnesses through hole in pilot's console. Splice correct wires together, as identified in step D.(1), using permanent splices.

(8) Remove warning tag and close ANTI-SKID NOSE POWER circuit breaker.

Figure
Detail

(9) Perform Adjustment/Test Nose Wheel Steering System (refer to 32-7-0).

NOTE: If only the nose wheel steering cables and control wheel have been replaced and no other rigging or adjustment has been changed, adjustment and operational check can be accomplished per 32-7-0, steps 1.B.(5), 1.B.(6), 1.C., 1.D.(2) thru 1.D.(5) (excluding handwheel force checks), 1.F.(10), and 1.F.(11).

LANDING GEAR NORMAL BRAKE SYSTEM - DESCRIPTION AND OPERATION

1. General

All wheels of the main and nose landing gear are equipped with power operated, air cooled, disc brakes. The main wheel brakes are powered by the No. 2 hydraulic power system and the nose wheel brakes are powered by the No. 1 hydraulic power system. Normal braking action begins at the pilots' rudder and brake pedals; see Figure 1. The left brake pedals (pilot's and copilot's position) connect to a forward torque tube and the right brake pedals connect to an aft torque tube. When toe pressure is applied to the pedals, the transverse torque tubes are rotated. Rotation of the forward torque tube actuates a cable system connected to the left MLG brake metering valve; rotation of the aft torque tube actuates a cable system connected to the right MLG brake metering valve. The left and right MLG brakes may be used together or separately.

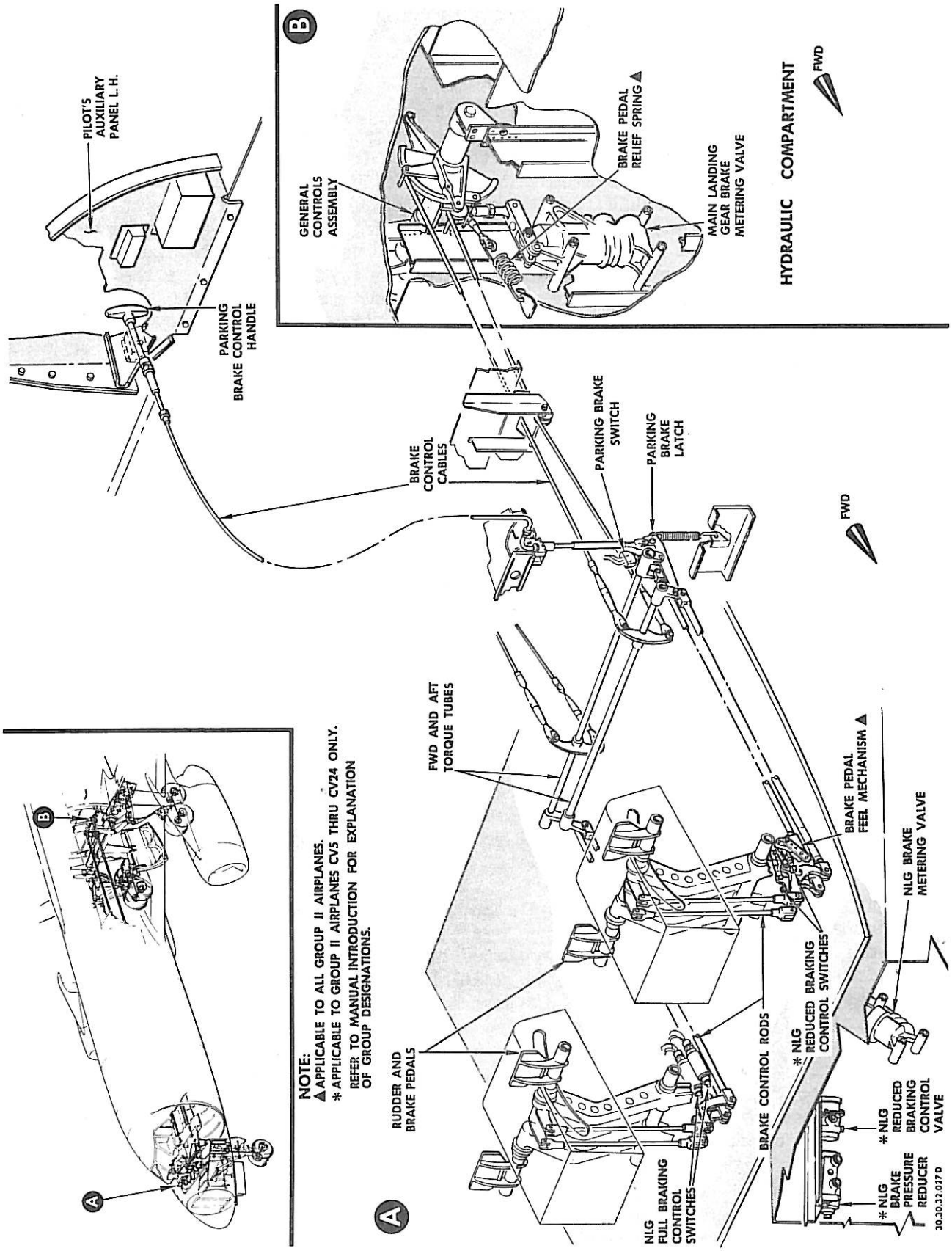
All *Group I airplanes and *Group II airplanes CV1 thru CV4 and CV25 and on have nose wheel braking action only when brake pedals are almost fully depressed. Two full braking control switches, actuated by the copilot's brake pedal linkage, control full braking action. These switches are wired in series and when both are actuated, hydraulic pressure from the NLG brake metering valve is applied to the nose wheel brakes.

*Group II airplanes CV5 thru CV24 have a reduced pressure NLG brake system in addition to the full braking system. The reduced pressure system consists of two control switches actuated by the pilot's brake pedal linkage, a control valve, and pressure reducer. The reduced braking control switches are wired in series and actuate when brake pedals are depressed to the "feel step" (Refer to feel mechanism description, following, for explanation of "feel step".). With both of the reduced braking control switches actuated, full braking pressure is blocked at the reduced braking control valve; only pressure from the NLG brake pressure reducer valve can actuate brakes. The NLG full braking control switches override the reduced braking control switches when the brake pedals are almost fully depressed and deenergize the NLG reduced braking control valve. Fully braking pressure from the NLG brake metering valve then actuates the nose wheel brakes.

An antiskid system on all airplanes monitors the amount of brake pressure applied to the wheels; when the system detects an impending skid, it closes off brake pressure to the associated brake, and ports the brake fluid to hydraulic system return until the wheel has recovered normal speed. Each of the eight main wheel brakes is separately controlled by the antiskid system; the two nose wheel brakes are controlled as one unit.

A parking brake control handle installed on the pilot's auxiliary panel is used to lock the MLG brakes for parking. The brakes are set by depressing the brake pedals, pulling out on the parking brake handle and then releasing the brake pedals while still holding the parking brake handle; and are released by momentarily depressing the brake pedals. Hydraulic pressure for the parking brake system is supplied by the MLG brake accumulator.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.


B
PILOT'S AUXILIARY PANEL L.H.
PARKING BRAKE CONTROL HANDLE
GENERAL CONTROLS ASSEMBLY
BRAKE PEDAL RELIEF SPRING ▲
MAIN LANDING GEAR BRAKE METERING VALVE
HYDRAULIC COMPARTMENT
FWD
BRAKE CONTROL CABLES
PARKING BRAKE SWITCH
PARKING BRAKE LATCH
FWD
FWD AND AFT TORQUE TUBES
BRAKE PEDAL FEEL MECHANISM ▲
NLG BRAKE METERING VALVE
RUDDER AND BRAKE PEDALS
* NLG REDUCED BRAKING CONTROL SWITCHES
BRAKE CONTROL RODS
* NLG REDUCED BRAKING CONTROL VALVE
NLG FULL BRAKING CONTROL SWITCHES
* NLG BRAKE PRESSURE REDUCER
30.30.32.027D
A
B
A
NOTE:
▲APPLICABLE TO ALL GROUP II AIRPLANES.
* APPLICABLE TO GROUP II AIRPLANES CV5 THRU CV24 ONLY.
REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.

All *Group II airplanes have a feel mechanism consisting of a spring-loaded striker and slotted link connected to each of the pilot's brake pedal linkages. Each mechanism provides a "feel step" at approximately one half pedal travel, enabling the pilot to maintain optimum brake pressure for landings on wet runways. The "feel step" is the point at which a noticeable increase in applied brake pedal force is required to depress pedals. The *Group II airplanes also have overcenter relief spring devices attached to the MLG brake metering valve control quadrants in the hydraulic compartment to reduce brake pedal forces.

2. Brake Hydraulic Systems

The brake hydraulic systems route pressure from the airplane hydraulic systems to the brake actuating cylinders. The No. 1 system furnishes power to the nose wheel brakes, and the No. 2 system furnishes power to the main wheel brakes. The NLG and MLG brake systems consist of brake metering valves, antiskid control valves, brake adjusters, and brake assemblies. The main wheel brake system also includes a brake accumulator which supplies a supplemental power source for brake operation, and shuttle valves for emergency pneumatic brake operation. *Group II airplanes CV5 thru CV24, in addition, have a NLG reduced braking control valve and pressure reducer. All airplanes have restrictors in the NLG hydraulic system return line and in the MLG hydraulic system pump supply line (downstream of the gear selector valves) to furnish automatic brake action during gear retraction. The restrictors create a back pressure, during the gear retraction cycle, which backs up through the brake metering valves and causes braking action. Refer to 32-2-0 and 32-4-0 for operation of the inflight braking system during gear retraction.

The nose wheel brake system differs in operation from the main wheel brakes in that the antiskid system must be turned on, and on *Group I airplanes and *Group II airplanes CV1 thru CV4 and CV25 and on, the brake pedals must be almost fully depressed to actuate nose wheel brakes. On *Group II airplanes CV5 thru CV24, the brake pedals must be depressed to or beyond the "feel step" to actuate nose wheel brakes. On all airplanes, when nose wheel steering is used, a microswitch on the steering unit shuts off the nose wheel brakes when the wheels are turned more than seven degrees from center. The pilot can also shut off the nose wheel brakes, independent of the antiskid system, by actuating a switch on the nose wheel steering handwheel. An amber warning light on the nose wheel steering handwheel illuminates when the nose wheel brake system is shut off.

The MLG brake hydraulic system meters brake pressure in proportion to toe pressure exerted on the brake pedals. When toe pressure is applied to the brake pedals, hydraulic pressure is routed through the MLG brake metering valves, the antiskid control valves, brake adjusters, and shuttle valves, and actuates the main wheel brakes.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

On *Group I airplanes and *Group II airplanes CV1 thru CV4 and CV25 and on, if the brake pedals are depressed against the pedal stops, the NLG full braking switches will actuate and energize the NLG antiskid control valve; the antiskid control valve in turn routes brake pressure through the NLG brake adjuster and actuates the nose wheel brakes. The NLG brake metering valve serves only as a pressure regulator for the antiskid control valve and does not control actuation of the nose wheel brakes.

On *Group II airplanes CV5 thru CV24, if the brake pedals are depressed to the "feel step", the NLG reduced braking control switches will actuate and energize the NLG reduced braking control valve and NLG antiskid control valve. The reduced braking control valve blocks off metered pressure from the NLG brake metering valve and allows only the brake pressure from the NLG brake pressure reducer valve to reach the antiskid control valve. The antiskid control valve in turn routes the reduced brake pressure through the NLG brake adjuster and actuates the brakes. At approximately full brake pedal travel, the NLG full braking control switches override the reduced braking control switches and deenergize the NLG reduced braking control valve. Full braking pressure from the NLG brake metering valve is then applied to the nose wheel brakes.

A schematic illustration of the MLG brake hydraulic system is shown on Figure 2; see 32-4-0, Figure 1 for schematic of the NLG brake hydraulic system.

A. Main Landing Gear Brake Accumulator.

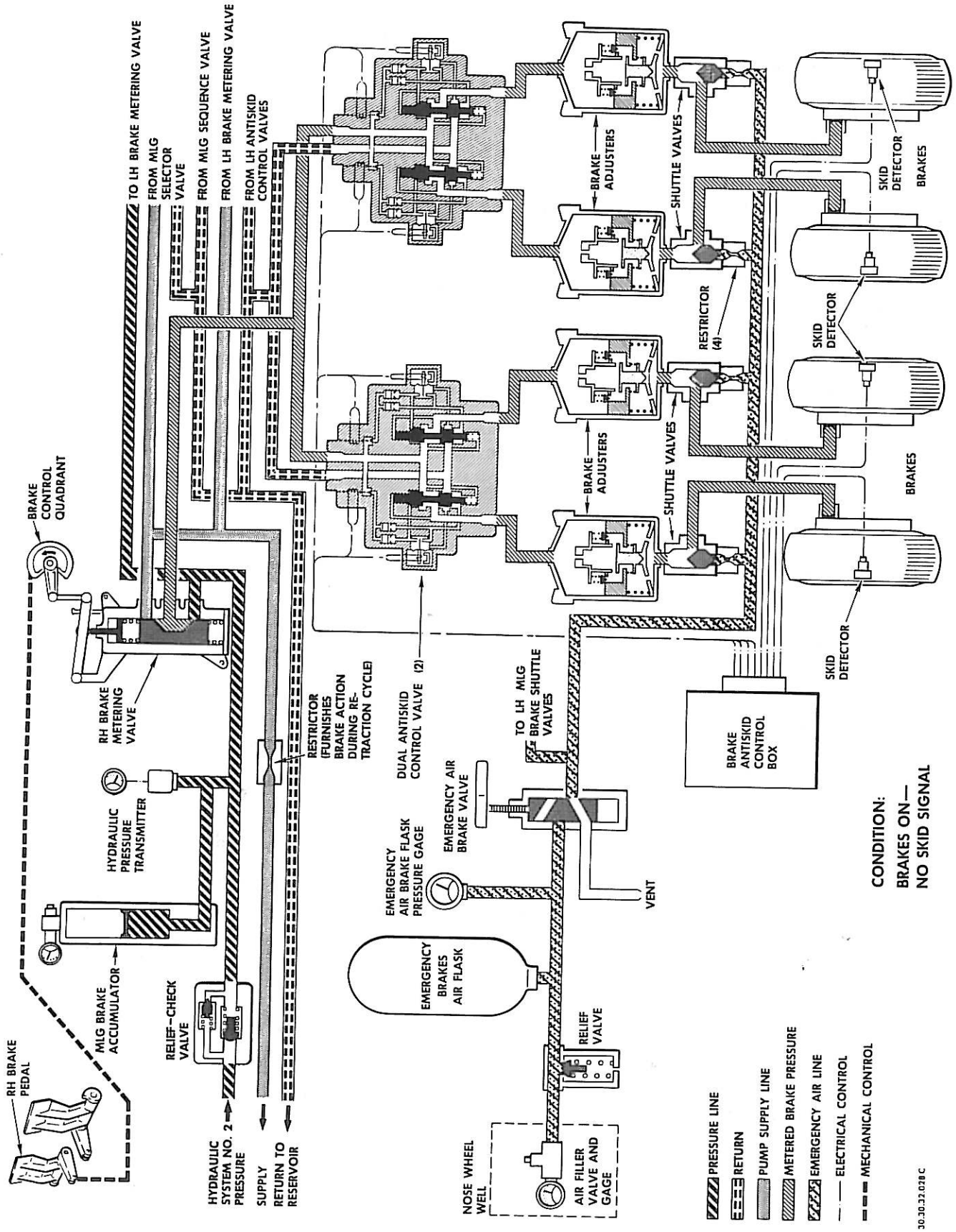
A 200 cubic inch cylindrical, piston-type accumulator in the hydraulic compartment, just forward of the hydraulic compartment door, contains an air or nitrogen precharge on one side of the piston and hydraulic fluid on the other. An air pressure filler gage and filler connection is located at the air end of the accumulator. Normal precharge pressure is 900 psig dry air or nitrogen, when there is no hydraulic pressure in the system.

Supplemental power from the main landing gear brake accumulator assures adequate hydraulic pressure to operate the main landing gear brakes. A relief-check valve isolates the accumulator from the No. 2 hydraulic system pressure line so that accumulator pressure is reserved for operation of the main landing gear brakes and parking brake system. This valve also prevents excessive hydraulic pressure from being trapped in the accumulator. A hydraulic brake pressure gage on the copilot's instrument panel indicates the pressure available for brake operation.

B. Brake Metering Valves.

The MLG brake metering valves, one for the left MLG and one for the right MLG, supply metered brake pressure to the MLG brakes in an

*Refer to Manual INTRODUCTION for Explanation of Group Designations.



Main Landing Gear
Brake Hydraulic System - Schematic
Figure 2

amount proportional to toe pressure exerted on the brake pedals. The MLG brake metering valves also resist brake application in proportion to the pressure actually delivered to the MLG brake lines to provide an artificial feel. The MLG brake metering valves are installed on the forward bulkhead of the hydraulic compartment.

The NLG brake metering valve is mechanically locked in the open position and has no connection to the brake pedals. The NLG brake metering valve acts only as a pressure regulator to supply a predetermined brake pressure to the NLG antiskid control valve. Location of the NLG brake metering valve is in the top of the nose wheel well.

C. Brake Adjusters.

Four brake adjusters in each main wheel well serve the eight main landing gear brakes; one brake adjuster in the nose wheel well serves the nose landing gear brakes. The brake adjusters maintain a constant brake running clearance and brake pedal travel regardless of brake lining wear, or whether the brakes are hot or cold.

D. Shuttle Valves.

Brake shuttle valves in each of the eight main landing gear brake lines isolate the emergency pneumatic brake system from the normal hydraulic system. The valves prevent the entry of hydraulic fluid into the pneumatic system, and the entry of air into the hydraulic system. Shuttle valves are not required in the nose landing gear brake system, as the nose wheel brakes are not operated by the emergency brake system.

The MLG brake shuttle valves are mounted between the brake adjusters and the brakes, and are detented in both the normal and emergency position. When emergency pneumatic pressure is applied it moves a double acting poppet valve to the emergency position. In the emergency position the hydraulic line is blocked while air pressure is routed to the brake actuating pistons for brake operation.

E. Brake Assemblies.

Each wheel is equipped with a self adjusting, multiple-disc brake consisting of rotating and stationary discs, stacked alternately. The rotating discs are keyed to the rim of the wheel, and the stationary discs are keyed to the brake assembly. Braking action is obtained by compressing the stack so that the flat surfaces of the discs are in sliding contact. The tighter the stack is compressed, the greater the braking action. Compression of the stack of discs is accomplished by a ring of small, interconnected hydraulic actuating cylinders. Acting in unison, the hydraulic pistons push a pressure plate, which in turn compresses the stack of discs. Spring cartridges return the pressure plate when brake pressure is released. The nose and main wheel brakes are of the same general configuration, differing only in physical size and in the number of actuating cylinders. The nose wheel brake assemblies mount on a flange which is an integral part of the axle. The

main wheel brake assemblies are permitted to "float" on the axles. They are kept from rotating by equalizer links connected to the shock struts. The equalizer links remove all torque loads from the main wheel axles, and prevent braking torque from tilting the trucks up on the forward pair of wheels.

F. NLG Reduced Braking Control Valve. (Applicable to *Group II Airplanes CV5 thru CV24 only.)

The NLG reduced braking control valve is mounted in the top of the nose wheel well, downstream of the NLG brake metering valve. The control valve, when energized, blocks off braking pressure from the NLG brake metering valve and allows only reduced braking pressure from the NLG brake pressure reducer valve to reach the nose wheel brakes.

G. NLG Brake Pressure Reducer Valve. (Applicable to *Group II Airplanes CV5 thru CV24 only.)

The NLG brake pressure reducer valve is mounted on the same mounting bracket as the NLG reduced braking control valve in the nose wheel well. The brake pressure reducer valve provides reduced braking pressure for nose wheel brake operation.

3. Antiskid Control System

The antiskid system (see Figure 3)is a fully modulated system consisting of one antiskid control box, a radio noise filter, five antiskid control valves, nine skid detectors (transducers), and connecting circuitry. Twisted, shielded wiring, between the antiskid system control box and the wheel skid detectors and between the antiskid system control box and the NLG antiskid control valve, minimize any stray voltage pickup which could adversely affect system operation. The system assists the pilot during landing operations by giving automatic protection against the dangers of wheel skidding, and provides the greatest possible braking efficiency. It also reduces tire wear and the possibility of a blowout.

Full metered brake pressure is applied to the brakes as long as there is no skid signal (In addition, to operate the NLG brakes, the nose wheel brakes control switch must be turned on and the brake pedals almost fully depressed, or depressed to or beyond the "feel step" on *Group II airplanes CV5 thru CV24.). The antiskid system controls braking only when the landing gear wheels approach a skid condition. Wheel skid is sensed by the skid detectors and transmitted to the control box, which in turn operates the antiskid control valves. The antiskid control valves regulate pressure to the brakes; when the deceleration rate of a wheel indicates an impending skid, the associated antiskid control valve reduces metered brake pressure to the affected brake, proportional to wheel slip, until the wheel recovers normal speed. The pilot can turn off the antiskid system with a control switch on the overhead switch panel, to revert the MLG brake system to manual operation; turning the antiskid system off deactivates the NLG brake

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

system. Another control switch on the pilot's nose wheel steering handwheel is used to deactivate the NLG brake system without turning off the antiskid system.

Two amber warning lights on the pilots' overhead switch panel, one for the nose wheels and one for the main wheels, illuminate whenever the antiskid system malfunctions or if electrical power supply to the antiskid system control box is interrupted. The main wheel inoperative light also illuminates whenever the antiskid control circuit breaker on the main circuit breaker panel is open. Another amber light on the pilot's nose wheel steering handwheel illuminates whenever the pilot manually deactivates the nose wheel brakes.

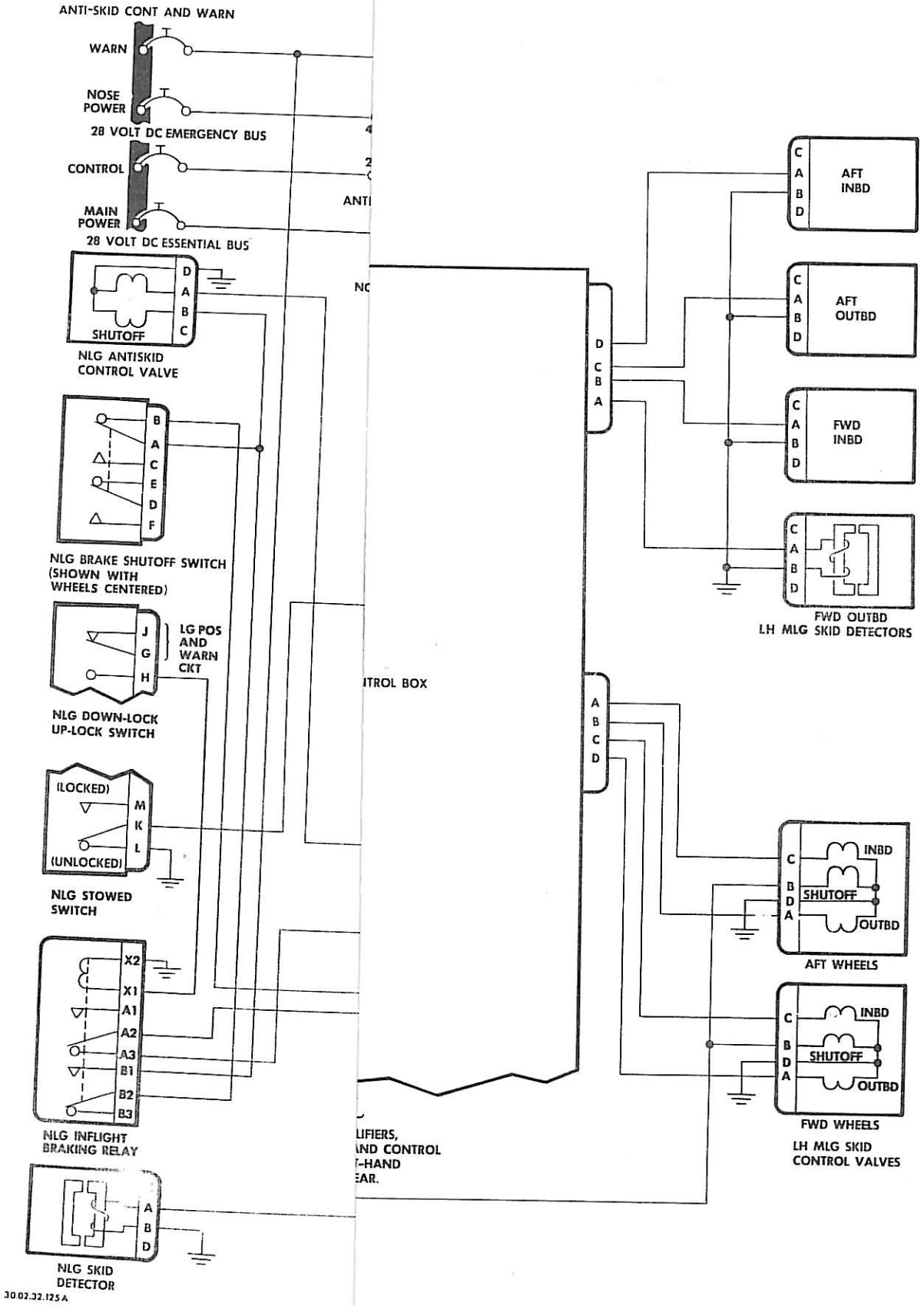
An inflight arming circuit in the main wheel portion of the antiskid system prevents landing with the brakes applied. This control circuit, through the landing gear ground safety relays, MLG antiskid control valves, and the antiskid system control box, holds each main wheel brake released until the wheels contact the runway and accelerate to landing speed. After initial contact with the runway, the antiskid system automatically compensates for excessive metered brake pressure and keeps the wheels rotating at, or near, nonskid speed while the airplane is brought to a fast, safe stop. The nose wheel portion of the antiskid system does not require an inflight arming circuit, as the nose wheel brakes will not actuate unless the brake pedals are almost fully depressed, or depressed to or beyond the "feel step" on *Group II airplanes CV5 thru CV24. A microswitch, actuated by the parking brake latch, deactivates the main wheel inflight arming circuit when the parking brakes are set. This assures that parking brake pressure will be available, without regard to position of the antiskid system control switch (overhead switch panel) or the landing gear ground safety relays.

The antiskid system also incorporates a fail-safe test circuit to check that the antiskid system inflight arming circuit is functioning properly. The test circuit consists of a test switch located on the pilots' overhead switch panel, and a relay and associated wiring. When the test switch is depressed, the amber antiskid warning lights on the overhead switch panel should illuminate; the lights should extinguish when the test switch is released. If the lights do not extinguish, a malfunction in the inflight arming circuit is indicated. The fail-safe test circuit further provides automatic reversion to manual braking, without skid protection, should the inflight arming circuit malfunction.

A. Antiskid System Control Box.

The antiskid system control box receives signals from the wheel skid detectors (transducers), and in turn transmits controlling signals to the antiskid control valves, which meter the brake pressure. The control box circuit consists of a series of resistors, capacitors, diodes, and transistors. The control box is in the right-hand main wheel well.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.



trol System - Schematic
Figure 3

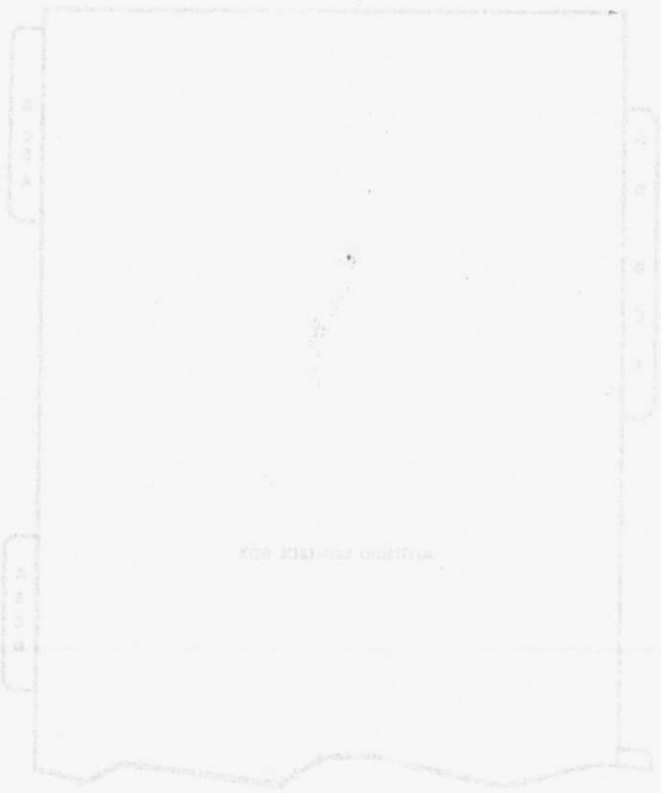
TEMPORARY REVISION NO. 32-60.

Insert facing 32-8-0, Page 8, dated Jan. 25/63 (or subsequent).

The information on the noted facing page is applicable to all airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-37, delete the following information where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete paragraph beginning with "The antiskid system also incorporates a fail-safe test circuit - - - -" in its entirety.



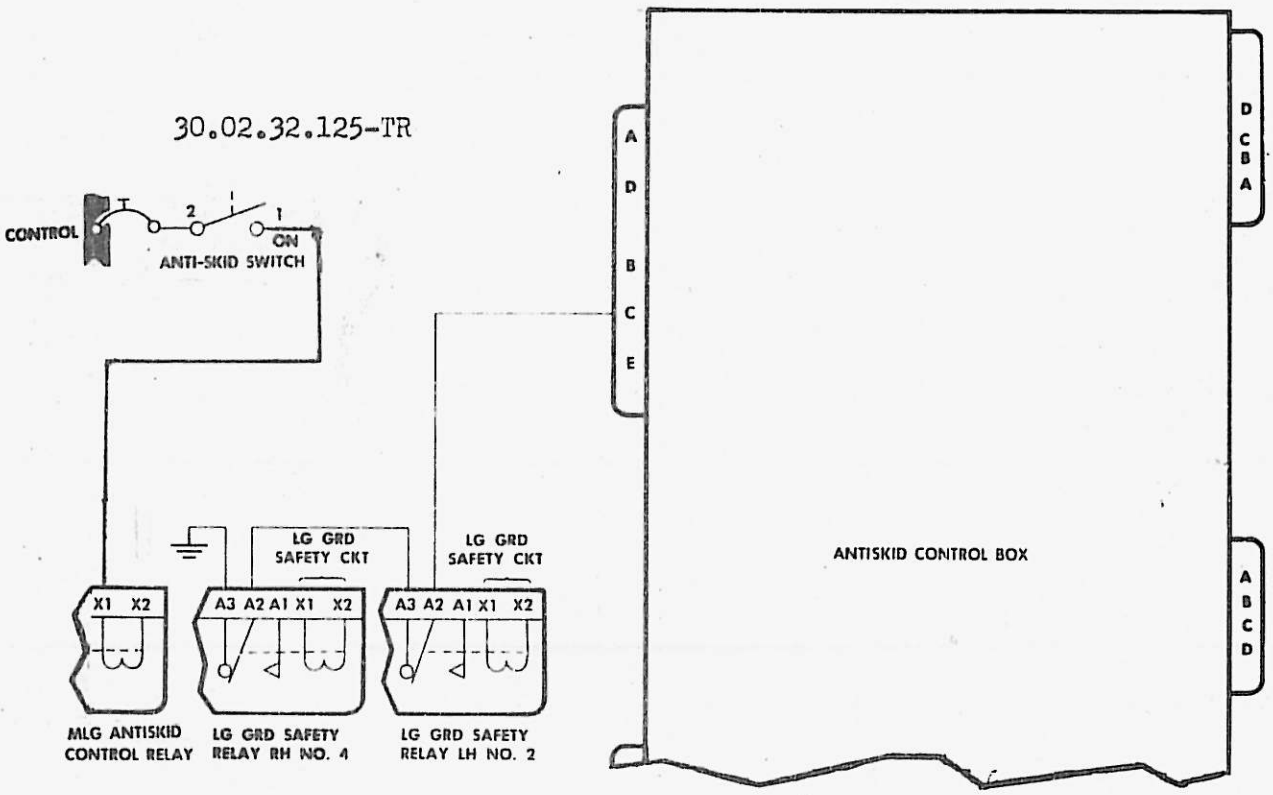
TEMPORARY REVISION NO. 32-59.

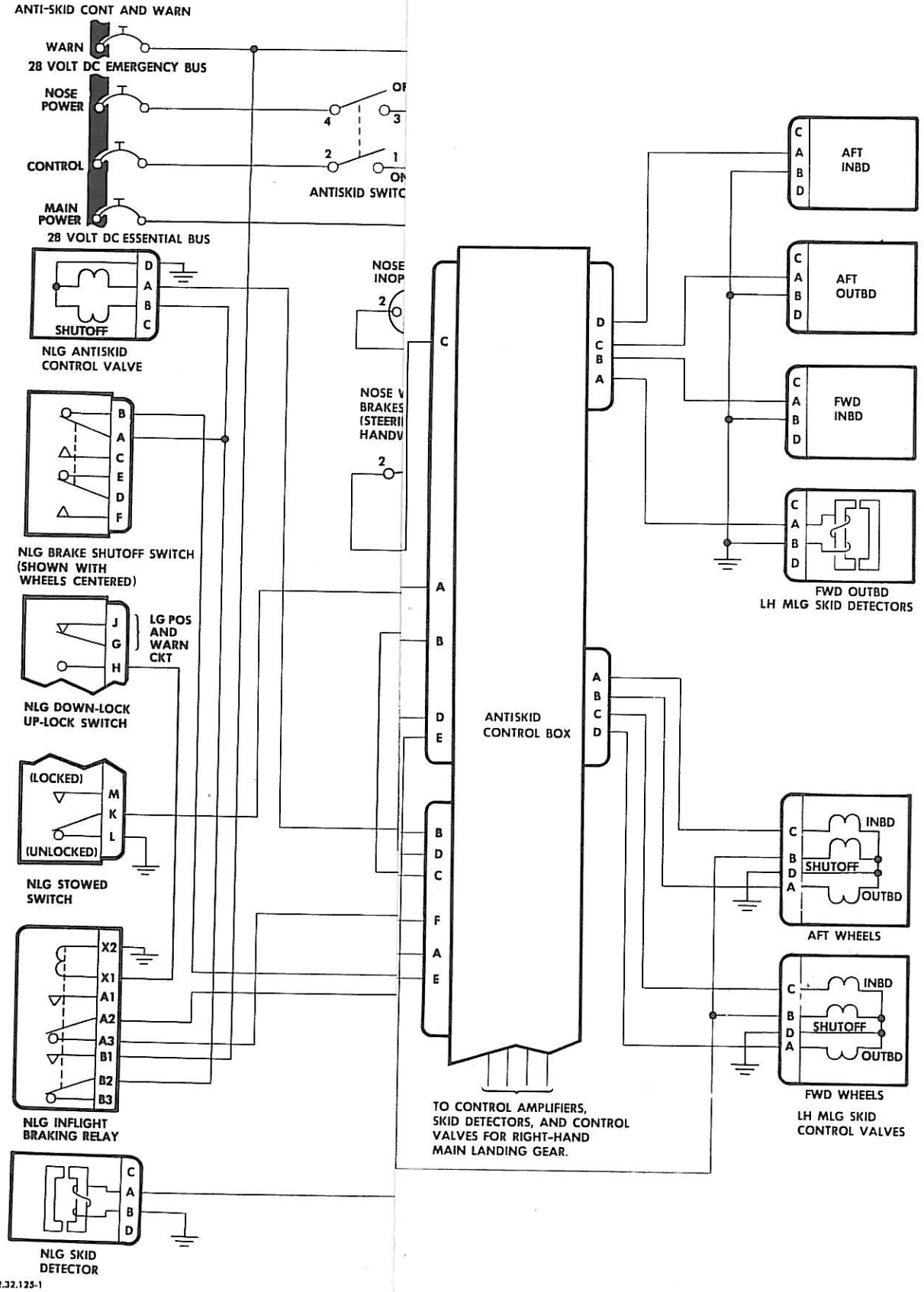
Insert facing 32-8-0, Page 9, dated Jan. 25/63 (or subsequent).

The schematic on the noted facing page is applicable to Group I airplanes and Group II airplanes CV1 through CV4 and CV25 and on except as follows: for airplanes not modified per Service Bulletin No. 32-37, substitute the following circuits where indicated. Refer to Manual INTRODUCTION for explanation of group designations.

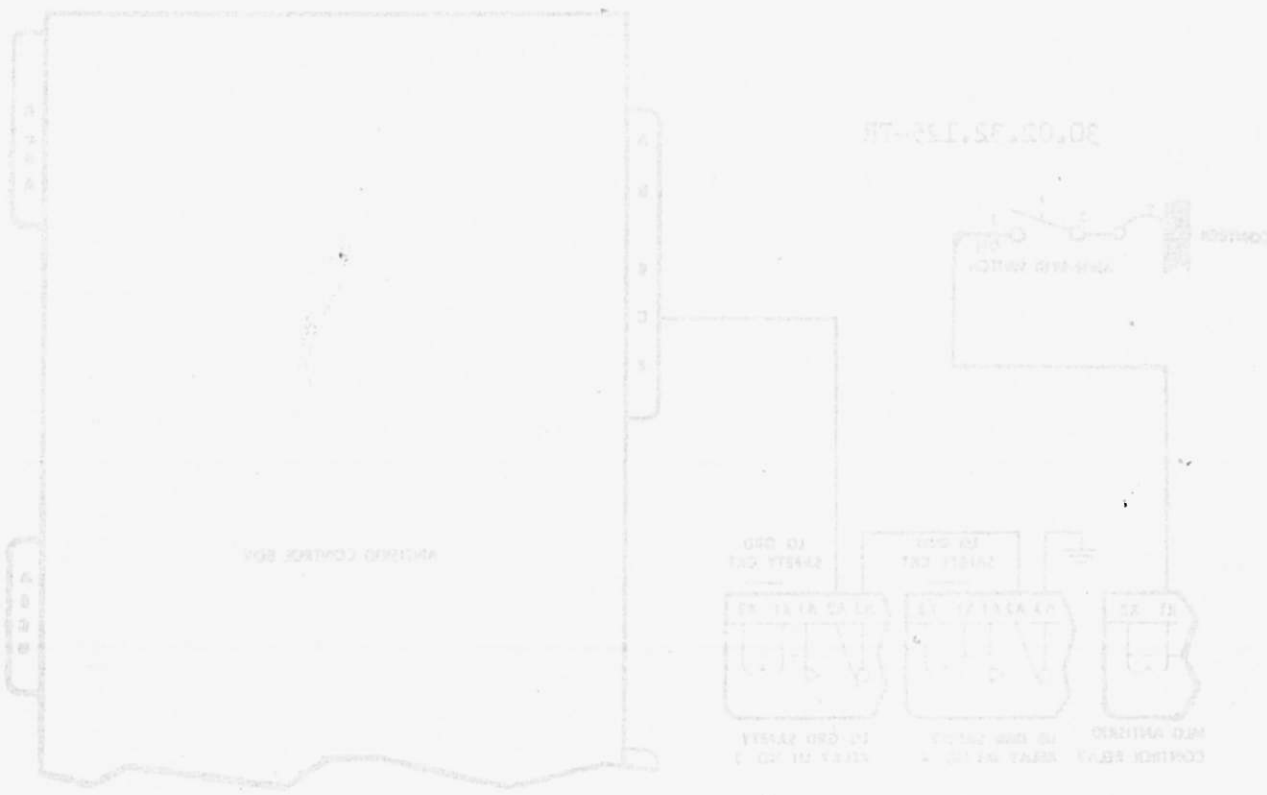
Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete the antiskid test relay, left-hand landing gear ground safety relay No. 5, right-hand landing gear ground safety relay No. 2, test switch, and associated wiring and substitute inflight arming circuit shown below. Connect "X1" of the MLG antiskid control relay to terminal "1" of antiskid control switch.





1 System - Schematic
(Sheet 1 of 2)



CONVAIR MODEL 30

MAINTENANCE MANUAL

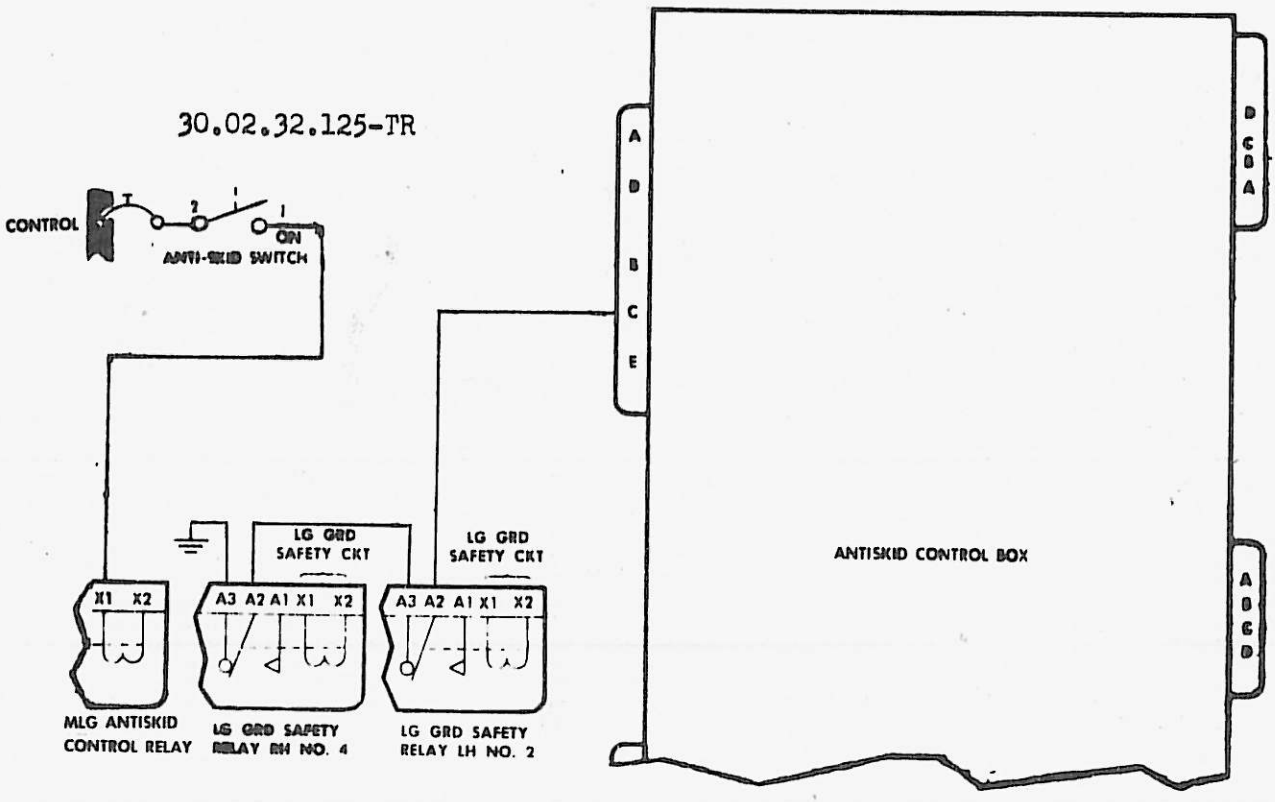
TEMPORARY REVISION NO. 32-70.

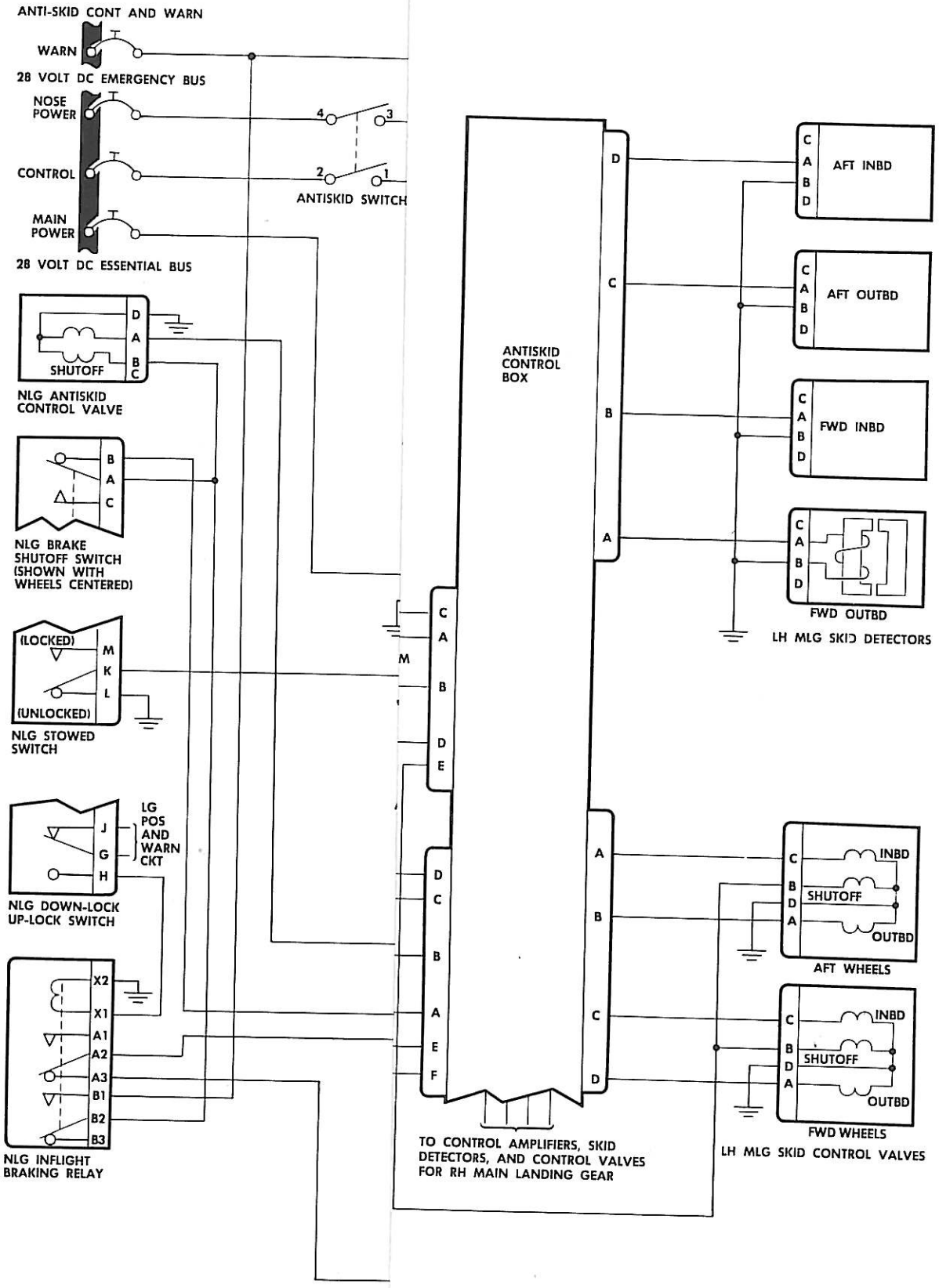
Insert facing 32-8-0, Page 10A, dated Jan. 25/63 (or subsequent).

The schematic on the noted facing page is applicable to Group II airplanes CV5 through CV24 except as follows: for airplanes not modified per Service Bulletin No. 32-37, substitute the following circuits where indicated. Refer to Manual INTRODUCTION for explanation of group designations.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete the antiskid test relay, left-hand landing gear ground safety relay No. 5, right-hand landing gear ground safety relay No. 2, test switch, and associated wiring and substitute inflight arming circuit shown below. Connect "X1" of the MLG antiskid control relay to terminal "1" of antiskid control switch.





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. System - Schematic
Sheet 2 of 2)

B. Antiskid Control Valves.

The five antiskid control valves, one in the nose wheel well and four in the main wheel wells, control brake hydraulic pressure as dictated by signals from the antiskid system control box. A single unit controls both of the nose wheel brakes and four dual units control the eight main landing gear brakes. The MLG antiskid control valves are normally open, and when energized, the valves reduce metered brake pressure in proportion to the skid signal. The NLG antiskid control valve is normally closed and must be energized before brake pressure can reach the NLG brakes; loss of electrical power to the NLG antiskid control valve causes the valve to close, and the NLG brakes are released.

C. Skid Detectors.

For skid detection, transducer-type skid detectors are used to sense the rate of change of wheel speed. The MLG brake skid detectors are mounted in each end of the MLG axles and are driven by couplings in the wheel hub caps. The NLG brake skid detector is mounted on the lower portion of the NLG shock strut and is driven through a helical gear on the NLG inner axle. All of the skid detectors are driven at a 1:1 ratio. Rotation of the skid detectors produces an output signal proportional to wheel speed. The control circuit detects wheel deceleration and compares rate of change of wheel speed with normal airplane deceleration and transmits signals to the control valves to effect brake pressure correction.

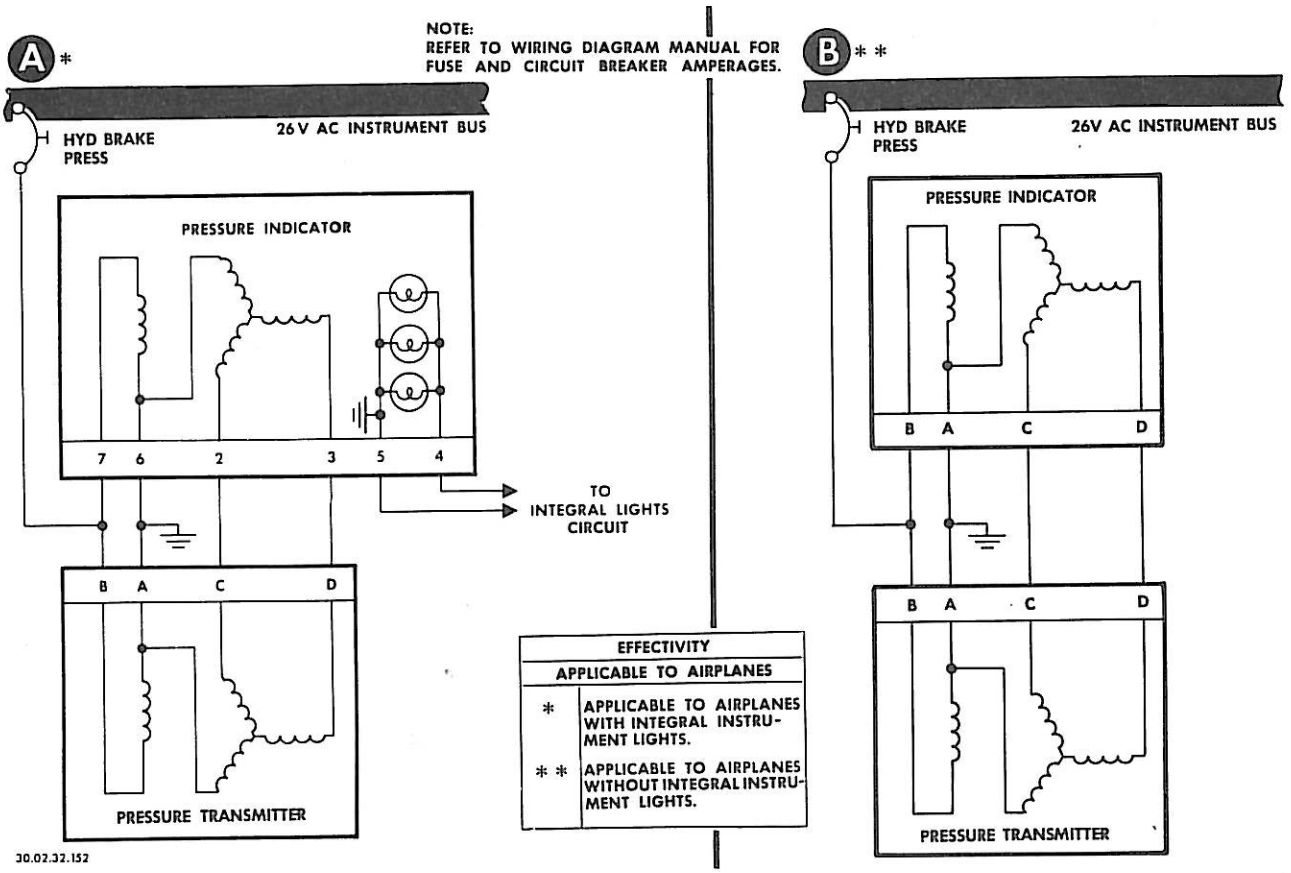
D. Antiskid System Filter.

A radio noise filter prevents false skid signals, caused by radio noise from the NLG skid detector (transducer), and the resultant relief of brake pressure at low wheel speeds. The filter is located on the aft side of the fiberglas shroud, in the top of the right-hand main wheel well, outboard of the antiskid system control box.

4. Main Landing Gear Hydraulic Brake Pressure Indicating System

The MLG hydraulic brake pressure indicating system furnishes a continuous indication of pressure in the MLG brake accumulator. The system is powered by the 26-volt ac instrument bus and consists of a remote synchro indicator, transmitter, and connecting circuitry: see Figure 4. The indicator is mounted near the bottom of the copilot's instrument panel and has a range of zero to 4000 psi. The dial is marked off in 100 psi increments.

The hydraulic brake pressure transmitter is shock-mounted to the forward bulkhead of the hydraulic compartment, above the MLG selector valve. Hydraulic pressure is routed to the transmitter from the pressure line downstream of the MLG brake accumulator relief-check valve. A zero adjustment and a filtered case-pressure relief port are located on the pressure transmitter case, adjacent to the hydraulic pressure port. See Figure 2 for schematic showing transmitter connection to MLG brake hydraulic system.



Main Landing Gear Hydraulic Brake Pressure Indicating System - Schematic
Figure 4

LANDING GEAR NORMAL BRAKE SYSTEM - TROUBLE SHOOTING

NOTE: Use antiskid system test unit TSTO 30-05408 to facilitate trouble shooting of the antiskid system. Connect test unit to airplane per instructions furnished with test unit.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
1. BRAKE PEDAL(S) WILL NOT DEPRESS	
A. Brake control linkage jammed or broken.	Check for broken parts or foreign objects in brake control linkage. Remove any foreign objects and repair or replace broken parts.
B. Defective MLG brake metering valve.	Relieve brake pedal relief spring tension (applicable to *Group II airplanes only) and disconnect malfunctioning control linkage at respective MLG brake metering valve (refer to 32-8-2). Depress brake pedal; if pedal depresses, replace disconnected brake metering valve. Readjust brake pedal relief spring tension (refer to 32-8-0, Adjustment/Test Normal Brake Controls - Rigging and Adjustment, step 1.C.(12)(d)).
2. BRAKE PEDAL(S) STIFF TO OPERATE	
A. Defective MLG brake metering valve.	Relieve brake pedal relief spring tension (applicable to *Group II airplanes only) and disconnect malfunctioning control linkage from respective MLG brake metering valve (refer to 32-8-2). Check brake pedal operation. Replace disconnected brake metering valve if pedal operates freely. Readjust brake pedal relief spring tension (refer to 32-8-0, Adjustment/Test Normal Brake Controls - Rigging and Adjustment, step 1.C.(12)(d)).
B. Cables not rigged properly.	Check cable rigging and adjust as necessary (refer to 32-8-0, Adjustment/Test Normal Brake Controls - Rigging and Adjustment, steps 1.C.(1), 1.C.(2), and 1.C.(4) thru 1.C.(6)).

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
2. BRAKE PEDAL(S) STIFF TO OPERATE (CONT)	
C. Warped or damaged pulleys.	Check cable pulleys for freedom of rotation and general condition. Replace damaged or binding pulleys.
D. Frayed cables.	Check condition of cables, especially at fairleads, guides, and pulleys. Replace damaged cables.
E. Control linkage bearings binding or damaged.	Check control linkage bearings for condition and lubricate or replace as necessary.
F. Brake pedal relief spring linkage(s) out of adjustment or defective. (Applicable to *Group II airplanes only.)	Check for defective parts in the brake pedal relief spring linkages and repair or replace as necessary. Adjust brake pedal relief spring tension (refer to 32-8-0, Adjustment/Test Normal Brake Controls - Rigging and Adjustment, step 1.C.(12)(d)).
G. Brake pedal feel mechanism binding. (Applicable to *Group II Airplanes only.)	Check brake pedal feel mechanism for freedom of operation; adjust and lubricate as required (refer to 32-8-0, Adjustment/Test Normal Brake Controls-Rigging and Adjustment, step 1.C.(12)).
3. BRAKE PEDAL(S) REMAINS DEPRESSED	
A. Parking brakes engaged.	Momentarily depress brake pedals to release parking brakes.
B. Brake control linkage jammed or broken.	Check for broken parts or foreign objects in brake control linkage. Remove any foreign objects and repair or replace broken parts.
C. Defective MLG brake metering valve.	Relieve brake pedal relief spring tension (applicable to *Group II airplanes only) and disconnect malfunctioning control linkages from respective MLG brake metering valve (refer to 32-8-2). Check brake pedal operation; if pedal operation is satisfactory, replace disconnected brake metering valve. Readjust brake pedal relief spring tension (refer to 32-8-0, Adjustment/Test Normal Brake Controls - Rigging and Adjustment, step 1.C.(12)(d)).

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
4. NOSE WHEEL BRAKES INOPERATIVE WITH BRAKE PEDALS DEPRESSED TO STOPS, AND ANTI-SKID CONTROL SWITCH (OVERHEAD SWITCH PANEL) AND NOSE WHEEL BRAKE CONTROL SWITCH (NOSE WHEEL STEERING HANDWHEEL) TURNED ON	
A. Loss of hydraulic pressure to NLG brake system.	Check the No. 1 hydraulic system pressure gage (copilot's instrument panel). If no pressure is indicated, refer to Chapter 29, HYDRAULIC POWER.
B. NLG brake line disconnected at quick disconnect.	Visually check quick disconnect between NLG brakes and connect if not connected. Turn knurled nut to full extent of travel in clockwise direction.
C. NLG full braking control switch(es) out of adjustment.	Check and adjust switches as necessary (refer to 32-8-0, Adjustment/Test Normal Brake Controls - Rigging and Adjustment, step 1.C.(11)).
D. NLG brake shutoff (wheels centered) switch out of adjustment.	Check switch adjustment (refer to 32-8-13, Adjustment/Test Nose Wheel Brake Shutoff Switch, steps 2.C.(1) thru 2.C.(4)) and adjust as necessary.
E. Defective ANTI-SKID NOSE POWER circuit breaker.	Check for 28 volts dc power at both sides of circuit breaker. If there is no power at the bus side of circuit breaker, refer to Chapter 24, ELECTRICAL POWER. If power is present at the bus but not through the circuit breaker, replace circuit breaker.
F. Defective antiskid system control box, or open circuit between: (1) ANTI-SKID NOSE POWER circuit breaker and ANTI-SKID control switch. (2) ANTI-SKID control switch and nose wheel brakes control switch (pilot's nose wheel steering handwheel).	With antiskid system test unit TSTO 30-05408 properly connected to airplane, check if test unit NOSE PWR & SOLENOID indicator light is illuminated. If light is not illuminated, disconnect second electrical harness plug from the left on bottom of antiskid system control box. Check for 28 volts dc power at pin C of plug. If power is available, replace antiskid system control box.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
4. NOSE WHEEL BRAKES INOPERATIVE WITH BRAKE PEDALS DEPRESSED TO STOPS, AND ANTI-SKID CONTROL SWITCH (OVERHEAD SWITCH PANEL) AND NOSE WHEEL BRAKE CONTROL SWITCH (NOSE WHEEL STEERING HANDWHEEL) TURNED ON (CONT)	
(3) Nose wheel brakes control switch and NLG antiskid control relay. (4) NLG antiskid control relay and NLG stowed switch. (5) NLG stowed switch and ground.	If power is not available at pin C of plug, check for continuity through noted wiring, switches, and relay. If no continuity, repair or replace wiring, switches, and relay as necessary.
G. Defective NLG antiskid control valve, or open circuit between: (1) Antiskid system control box and NLG inflight braking relay. (2) NLG inflight braking relay and NLG full braking control switches. (3) NLG full braking control switches and NLG brake shutoff (wheels centered) switch. (4) NLG brake shutoff (wheels centered) switch and NLG antiskid control valve. (5) NLG antiskid control valve and ground.	If test unit NOSE PWR & SOLENOID light was illuminated in paragraph 4.F. preceding, check for continuity through noted wiring, switches, and relay (with brake pedals fully depressed and nose wheels centered). If continuity is obtained, replace NLG antiskid control valve. If no continuity, repair or replace wiring, switches, and relay as necessary.
H. Defective wiring between: (1) Antiskid system control box and NLG skid detector (transducer). (2) NLG skid detector and ground. (3) Antiskid system control box and NLG antiskid control valve.	Check for continuity through noted wiring. If no continuity, repair or replace wiring as necessary.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
4. NOSE WHEEL BRAKES INOPERATIVE WITH BRAKE PEDALS DEPRESSED TO STOPS, AND ANTI-SKID CONTROL SWITCH (OVERHEAD SWITCH PANEL) AND NOSE WHEEL BRAKE CONTROL SWITCH (NOSE WHEEL STEERING HANDWHEEL) TURNED ON (CONT)	
I. Defective NLG brake metering valve.	Install hydraulic pressure gage in brake pressure line, downstream of NLG brake metering valve. Pressurize No. 1 hydraulic system (refer to Chapter 29, HYDRAULIC POWER) and depress brake pedals against stops. Replace NLG brake metering valve if no pressure is indicated.
J. Defective NLG brake adjuster.	Install hydraulic pressure gage between NLG brake adjuster and brakes. Pressurize No. 1 hydraulic system (refer to Chapter 29, HYDRAULIC POWER) and depress brake pedals against stops. Replace NLG brake adjuster if no pressure is indicated.
5. NOSE WHEEL BRAKES DO NOT ACTUATE WHEN BRAKE PEDALS ARE DEPRESSED TO "FEEL STEP" (Applicable to *Group II airplanes CV5 thru CV24 only.)	
A. NLG reduced braking control switch(es) out of adjustment.	Check if NLG brakes actuate when brake pedals are depressed against stops. If brakes do not actuate, refer to paragraph 4. If NLG brakes do actuate when brake pedals are depressed to stops, check and adjust NLG reduced braking control switches (refer to 32-8-0, Adjustment/Test Normal Brake Controls - Rigging and Adjustment, step 1.C.(12)).
B. Open circuit between: (1) NLG inflight braking relay and NLG reduced braking control switches. (2) NLG reduced braking control switches and NLG brake shutoff (wheels centered) switch.	Check for continuity through noted wiring and switches (with brake pedals depressed to "feel step"). If no continuity, repair or replace wiring and switches as necessary.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
6. FULL BRAKING PRESSURE IS APPLIED TO NOSE WHEEL BRAKES WHEN BRAKE PEDALS ARE DEPRESSED TO "FEEL STEP" (Applicable to *Group II airplanes CV5 thru CV24 only.)	
A. Defective NLG reduced braking control valve or open circuit between: (1) NLG reduced braking control switches and NLG full braking control switches. (2) NLG full braking control switches and NLG reduced braking control valve. (3) NLG reduced braking control valve and ground.	Check for continuity through noted switches, wiring, and control valve. If no continuity, repair or replace wiring, switches, and control valve as necessary.
7. NOSE WHEEL BRAKES DO NOT ACTUATE DURING GEAR RETRACTION	
A. Defective NLG inflight braking relay, or wiring between: (1) ANTI-SKID WARN circuit breaker and NLG inflight braking relay. (2) NLG inflight braking relay and NLG antiskid control valve. (3) NLG inflight braking relay and NLG down-lock up-lock switch.	Check for continuity through noted wiring and relay. If continuity is obtained, replace inflight braking relay. If no continuity, repair or replace wiring as necessary.
8. Deleted.	
9. ANTISKID PROTECTION LOST ON NOSE WHEEL BRAKES	
A. Defective NLG skid detector (transducer), or wiring between NLG skid detector and antiskid system control box.	With the antiskid system test unit TSTO 30-05408 properly connected to airplane, actuate VTVM FUNCTION SELECTOR switch on test unit to TRANSDUCER OUTPUT position. Actuate WHEEL SELECTOR switch on test unit to 1 & 2 position.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
9. ANTISKID PROTECTION LOST ON NOSE WHEEL BRAKES (CONT)	
	Rotate NLG skid detector at 1500 (±100) rpm and check VTVM reading on test unit. If VTVM does not indicate 1 to 3 volts, check for continuity between NLG skid detector and the antiskid system control box. If continuity is obtained, replace the NLG skid detector. If no continuity, repair or replace wiring.
B. Defective antiskid system control box, or NLG antiskid control valve.	If VTVM, in paragraph 9.A. preceding, does indicate 1 to 3 volts, actuate REGULATED B+ switch on test unit to ON position. If VTVM does not indicate 20.0 to 20.5 volts, replace antiskid system control box.
	If VTVM does indicate 20.0 to 20.5 volts, actuate VTVM FUNCTION SELECTOR switch to VALVE DC position. Rotate NLG skid detector at 1500 (±100) rpm and check VTVM reading. If VTVM indicates 3.5 to 4.5 volts, replace NLG antiskid control valve. If VTVM does not indicate 3.5 to 4.5 volts, replace antiskid system control box.
10. NOSE WHEEL BRAKES AMBER INDICATOR LIGHT (NOSE WHEEL STEERING HANDWHEEL) DOES NOT ILLUMINATE WHEN NOSE WHEEL BRAKES CONTROL SWITCH IS TURNED OFF	
A. Burned out bulb.	Remove bulb and test. Replace burned out bulb.
B. Defective dim relay box No. 5.	Refer to Chapter 31, INSTRUMENTS for source of trouble.
C. Defective NLG antiskid control relay, or wiring between:	Check for continuity through noted wiring, warning light, switch, and relay. If no continuity, repair or replace wiring, warning light, switch, and relay.
(1) Nose wheel brakes control switch and amber warning light.	
(2) Amber warning light and dim relay box No. 5.	

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
10. NOSE WHEEL BRAKES AMBER INDICATOR LIGHT (NOSE WHEEL STEERING HANDWHEEL) DOES NOT ILLUMINATE WHEN NOSE WHEEL BRAKES CONTROL SWITCH IS TURNED OFF (CONT)	
(3) Dim relay box No. 5 and NLG antiskid control relay.	
(4) NLG antiskid control relay and ground.	
11. NOSE WHEEL INOP WARNING LIGHT (OVERHEAD SWITCH PANEL) DOES NOT ILLUMINATE WHEN ANTI-SKID CONTROL SWITCH (OVERHEAD SWITCH PANEL) IS TURNED OFF	
A. Burned out bulb.	Depress warning light to test bulb. If light does not illuminate, remove and check bulb. Replace burned out bulb.
B. Defective ANTI-SKID WARN circuit breaker.	Check for 28 volts dc power at both sides of circuit breaker. If there is no power at the bus side of circuit breaker, refer to Chapter 24, ELECTRICAL POWER. If power is present at the bus but not through the circuit breaker, replace circuit breaker.
C. Defective dim relay box No. 6.	Refer to Chapter 31, INSTRUMENTS for source of trouble.
D. Defective NLG antiskid control relay, or open circuit between:	Check for continuity through noted wiring, warning light, and relay. If no continuity, repair or replace wiring, warning light, and relay as necessary.
(1) ANTI-SKID WARN circuit breaker and warning light.	
(2) Warning light and dim relay No. 6.	
(3) Dim relay No. 6 and NLG antiskid control relay.	
(4) NLG antiskid control relay and ground.	

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
12. ALL MAIN WHEEL BRAKES INOPERATIVE	
A. Loss of hydraulic pressure to MLG brake system.	Check the brake hydraulic pressure gage (copilot's instrument panel). If no pressure is indicated, refer to Chapter 29, HYDRAULIC POWER.
13. ALL BRAKES ON LEFT OR RIGHT MAIN GEAR INOPERATIVE	
A. MLG brake controls improperly rigged or damaged.	Check mechanical controls to MLG brake metering valves for disconnected linkage, broken parts or cables not properly installed. Repair or replace as necessary. Check rigging and adjust as necessary.
B. Defective MLG brake metering valve.	Install hydraulic pressure gage between respective brake metering valve and antiskid control valves. Pressurize No. 2 hydraulic system and depress brake pedals. Replace brake metering valve if no pressure is indicated.
14. ONE BRAKE ON LEFT OR RIGHT MAIN GEAR INOPERATIVE	
A. Defective MLG antiskid control valve.	Install hydraulic pressure gage between respective antiskid control valve and brake adjuster. Pressurize No. 2 hydraulic system and depress pedals. Replace antiskid control valve if no pressure is indicated.
B. Defective MLG brake adjuster.	Install hydraulic pressure gage between respective brake adjuster and shuttle valve. Pressurize No. 2 hydraulic system and depress brake pedals. Replace brake adjuster if no pressure is indicated.
C. Defective MLG brake shuttle valve.	Install hydraulic pressure gage between brake shuttle valve and brake assembly. Pressurize No. 2 hydraulic system and depress brake pedals. Replace brake shuttle valve if no pressure is indicated.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
15. MAIN WHEEL BRAKE(S) INOPERATIVE WHEN ANTI-SKID CONTROL SWITCH (OVERHEAD SWITCH PANEL) IS TURNED ON	
A. Defective antiskid system control box, or closed circuit between antiskid system control box and landing gear ground safety relays.	If one or more MLG brakes actuate, replace antiskid system control box. If all MLG brakes are inoperative, disconnect extreme LH electrical harness plug from bottom of antiskid system control box. Check for continuity between pin C of plug and ground. If no continuity, replace antiskid system control box. If continuity is obtained, correct circuit through LH landing gear ground safety relay No. 5, RH landing gear ground safety relay No. 2 and antiskid system test relay as necessary.
B. Defective wiring between:	Check for continuity through noted wiring. If no continuity, repair or replace wiring as necessary.
(1) Antiskid system control box and skid detector (transducer) of inoperative MLG brake.	
(2) Skid detector (transducer) of inoperative MLG brake and ground.	
(3) Antiskid system control box and antiskid control valve of inoperative MLG brake.	
16. ANTISKID PROTECTION LOST ON MAIN WHEEL BRAKE(S)	
A. Defective ANTI-SKID MAIN POWER circuit breaker.	Refer to paragraph 4.E., substituting ANTI-SKID MAIN POWER for ANTI-SKID NOSE POWER.
B. Defective ANTI-SKID CONT circuit breaker.	Refer to paragraph 4.E., substituting ANTI-SKID CONT for ANTI-SKID NOSE POWER.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 32-61.

Insert facing 32-8-0, Page 110, dated Jan. 25/63 (or subsequent).

The trouble shooting on noted facing page is applicable to all airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-37, substitute the following procedure where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete paragraph 15.A. in its entirety and replace with the following:

A.	Defective antiskid system control box, or closed circuit between antiskid system control box and landing gear ground safety relays.	If one or more MLG brakes actuate, replace antiskid system control box. If all MLG brakes are inoperative, disconnect extreme LH electrical harness plug from bottom of antiskid system control box. Check for continuity between pin C of plug and ground. If no continuity, replace antiskid system control box. If continuity is obtained, correct circuit through LH landing gear ground safety relay No. 2 and RH landing gear ground safety relay No. 4 as necessary.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
16. ANTISKID PROTECTION LOST ON MAIN WHEEL BRAKE(S)(CONT)	
C. Open circuit between: (1) ANTI-SKID MAIN POWER circuit breaker and MLG antiskid control relay. (2) MLG antiskid control relay and antiskid radio noise filter. (3) Antiskid radio noise filter and antiskid system control box.	With antiskid system test unit TSTO 30-05408 properly connected to airplane, check if test unit MAIN PWR & SOLENOID indicator light is illuminated. If light is not illuminated, disconnect extreme LH electrical harness plug from bottom of antiskid system control box. Check for 28 volts dc power at pin A of plug. If no power is available at pin A of plug, check for continuity through noted wiring, relay, and filter. If no continuity, repair or replace wiring, relay, and filter, as necessary.
D. Open circuit between: (1) ANTI-SKID CONT circuit breaker and ANTI-SKID control switch. (2) ANTI-SKID control switch and MLG antiskid control relay. (3) MLG antiskid control relay and parking brake switch. (4) Parking brake switch and RH MLG down-lock switch. (5) RH MLG down-lock switch and ground.	If trouble was not located in paragraph 16.C., check for continuity through noted wiring, switches, and relay. If no continuity, repair or replace wiring, switches, and relay as necessary.
E. Defective MLG skid detector (transducer), or wiring between skid detector and antiskid system control box.	With the antiskid system test unit TSTO 30-05408 properly connected to airplane, actuate VTVM FUNCTION SELECTOR switch on test unit to TRANSDUCER OUTPUT position. Actuate WHEEL SELECTOR switch on test unit to applicable wheel.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
16. ANTISKID PROTECTION LOST ON MAIN WHEEL BRAKE(S) (CONT)	
	Rotate applicable MLG skid detector at 1500 (±100) rpm and check VTVM reading on test unit. If VTVM does not indicate 1 to 3 volts, check for continuity between applicable MLG skid detector and antiskid system control box. If continuity is obtained, replace applicable skid detector. If no continuity repair or replace wiring.
F. Defective antiskid system control box, or MLG antiskid control valve.	If VTVM, in paragraph 16.E. preceding, does indicate 1 to 3 volts, actuate REGULATED B+ switch on test unit to ON position. If VTVM does not indicate 20.0 to 20.5 volts, replace antiskid system control box.
	If VTVM does indicate 20.0 to 20.5 volts, actuate VTVM FUNCTION SELECTOR switch to VALVE DC position. Rotate applicable MLG skid detector at 1500 (±100) rpm and check VTVM reading. If VTVM indicates 3.5 to 4.5 volts, replace applicable MLG antiskid control valve. If VTVM does not indicate 3.5 to 4.5 volts, replace antiskid system control box.
17. INFLIGHT ARMING CIRCUIT INOPERATIVE	
A. Defective antiskid system control box, or open circuit between: (1) Antiskid system control box and antiskid system test relay. (2) Antiskid system test relay and LH landing gear ground safety relay No. 5.	With antiskid system test unit TSTO 30-05408 properly connected to airplane, actuate test unit GROUND SAFETY switch to AIRBORNE position. If MLG brakes release, replace antiskid system control box. If MLG brakes do not release, disconnect extreme LH electrical harness plug from bottom of antiskid system control box. Check for continuity between pin C of plug and ground. If no continuity is obtained, correct circuit through noted landing gear ground safety relays.

TEMPORARY REVISION NO. 32-62.

Insert facing 32-8-0, Page 112, dated Jan. 25/63 (or subsequent).

The trouble shooting on noted facing page is applicable to all airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-37, substitute the following procedure where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete paragraph 17. in its entirety and replace with the following:

17. INFLIGHT ARMING CIRCUIT INOPERATIVE

A. Defective antiskid system control box, or open circuit between: (1) Antiskid system control box and LH landing gear ground safety relay No. 2. (2) LH landing gear ground safety relay No. 2 and RH landing gear ground safety relay No. 4. (3) RH landing gear ground safety relay No. 4 and ground.	With antiskid system test unit TSTO 30-05408 properly connected to airplane, actuate test unit GROUND SAFETY switch to AIRBORNE position. If MLG brakes release, replace antiskid system control box. If MLG brakes do not release, disconnect extreme LH electrical harness plug from bottom of antiskid system control box. Check for continuity between pin C of plug and ground. If no continuity is obtained, correct circuit through noted landing gear ground safety relays.

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION

17. INFLIGHT ARMING CIRCUIT INOPERATIVE (CONT)

(3) LH landing gear ground safety relay No. 5 and RH landing gear ground safety relay No. 2.	
(4) RH landing gear ground safety relay No. 2 and and ground.	

18. MAIN WHEEL BRAKES WILL NOT ACTUATE WITH ANTI-SKID CONTROL SWITCH (OVERHEAD SWITCH PANEL) TURNED ON AND PARKING BRAKE HANDLE PULLED OUT

A. Parking brake switch out of adjustment or defective.	Check adjustment of switch (refer to 32-8-10, step 2.D.(2)) and adjust as necessary. If switch adjustment is satisfactory, replace switch.

19. MAIN WHEEL INOP WARNING LIGHT (OVERHEAD SWITCH PANEL) DOES NOT ILLUMINATE WHEN ANTI-SKID CONTROL SWITCH IS TURNED OFF

A. Burned out bulb.	Refer to paragraph 11.A.
B. Defective ANTI-SKID WARN circuit breaker.	Refer to paragraph 11.B.
C. Defective dim relay box No. 1.	Refer to Chapter 31, INSTRUMENTS for source of trouble.
D. Defective MLG antiskid control relay, or power circuit between:	Check for continuity through noted wiring, warning light, and relay. If no continuity, repair or replace wiring, warning light, and relay as necessary.
(1) ANTI-SKID WARN circuit breaker and warning light.	
(2) Warning light and dim relay box No. 1.	
(3) Dim relay box No. 1 and MLG antiskid control relay.	
(4) MLG antiskid control relay and ground.	

POSSIBLE CAUSE	ISOLATION PROCEDURE AND CORRECTION
20. MAIN WHEEL INOP AND NOSE WHEEL INOP LIGHTS DO NOT ILLUMINATE WHEN ANTI-SKID TEST SWITCH (OVERHEAD SWITCH PANEL) IS DEPRESSED AND ANTI-SKID CONTROL SWITCH (OVERHEAD SWITCH PANEL) IS TURNED ON	
A. Defective antiskid test relay, or open circuit between:	Check for continuity through noted wiring, test switch, and relay. If no continuity, repair or replace wiring, switch, and relay as necessary.
(1) Test switch and ground.	
(2) Test switch and antiskid system test relay.	
21. MAIN WHEEL INOP AND NOSE WHEEL INOP LIGHTS DO NOT EXTINGUISH WHEN ANTI-SKID TEST SWITCH (OVERHEAD SWITCH PANEL) IS RELEASED	
A. Inflight arming circuit defective.	Refer to paragraph 15.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 32-63.

Insert facing 32-8-0, Page 114, dated Jan. 25/63 (or subsequent).

The trouble shooting on noted facing page is applicable to all airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-37, delete procedures where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete paragraphs 20. and 21. in their entirety.

LANDING GEAR NORMAL BRAKE SYSTEM - MAINTENANCE PRACTICES

1. Adjustment/Test Normal Brake Controls - Rigging and Adjustment (see Figure 201)

A. Equipment Required.

(1) Test tool TSTO 22-04309, or equivalent protractor, to rig brake pedal neutral position and check pedal travel.

(2) Two cable tensiometers with a range of 10 to 150 pounds and calibrated to measure 3/32 x 7 x 7 cable and 1/8 x 1 x 19 cable.

(3) The following, or equivalent, rigging pins.

(a) Two 22-J107-2.

(b) Two 22-J107-3.

(4) Three hydraulic pressure test gages calibrated 0 to 2000 psig (minimum) in 50-pound increments.

NOTE: Gages must be equipped with fittings to connect to brake assemblies.

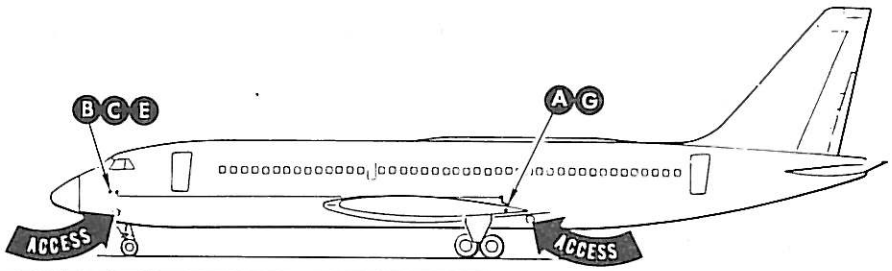
(5) External source of 115/200 volt, 3-phase, 400 cps ac electrical power.

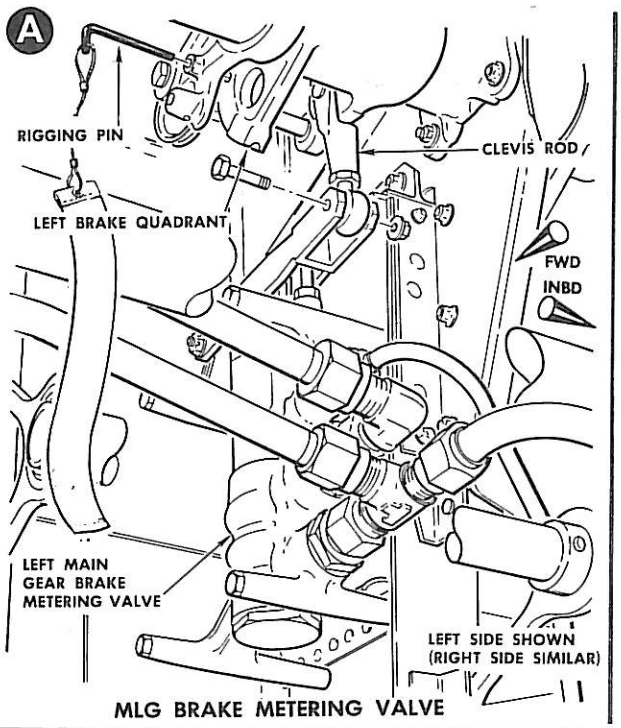
(6) Hydraulic power unit (Skydrol 500A hydraulic fluid) capable of delivering 3000 psig.

B. Preparation.

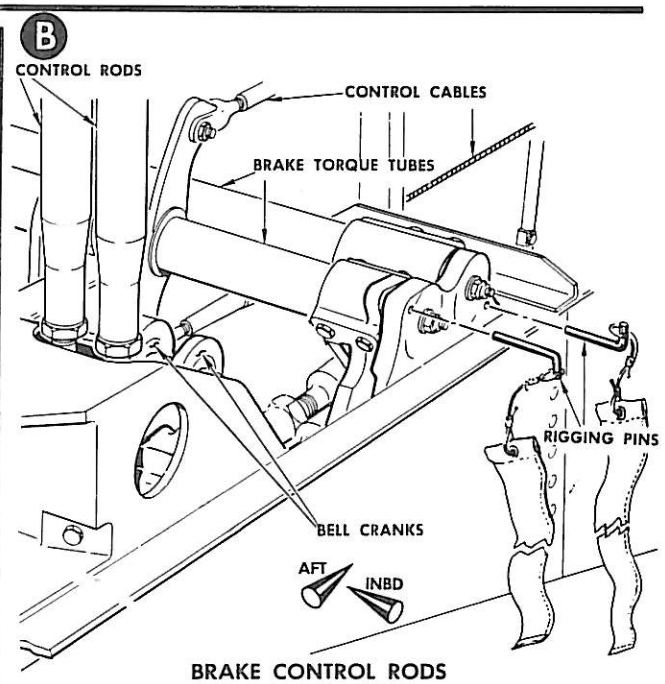
	Figure Detail
(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).	
(2) *For Group II airplanes, back off turnbuckles on brake pedal relief springs above MLG brake metering valves to relax spring tension.	G,H
WARNING: DO NOT PROCEED WITH RIGGING UNLESS STEP (2), PRECEDING, HAS BEEN ACCOMPLISHED.	
(3) Disconnect clevis rods from each of the MLG brake metering valves.	A
(4) Check that all cable runs are correctly routed.	
(5) Check that all cable guards are correctly installed and that the cables are in pulley grooves.	
(6) Check that full brake pedal travel is available at all rudder pedal positions.	

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

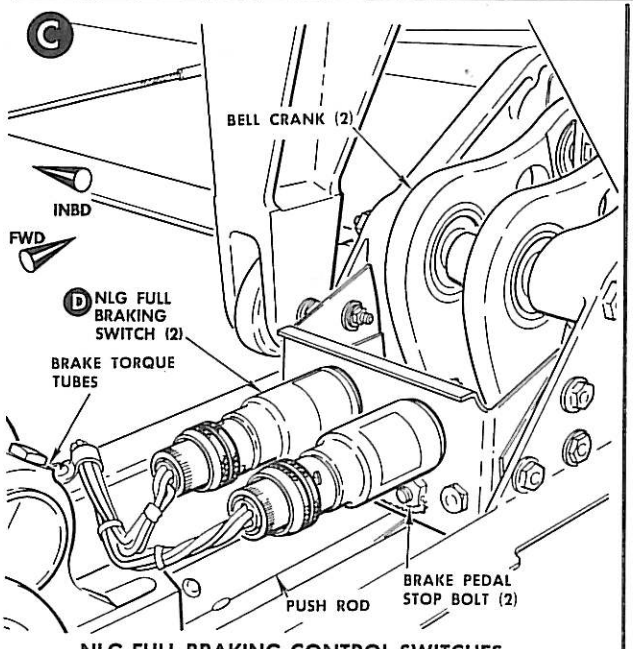




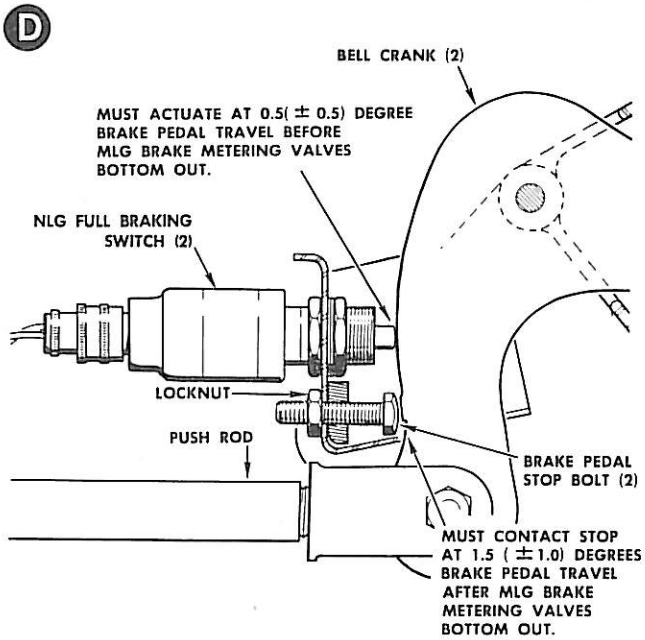
MLG BRAKE METERING VALVE



BRAKE CONTROL RODS AND TORQUE TUBES
(FORWARD UNDERFLOOR AREA)

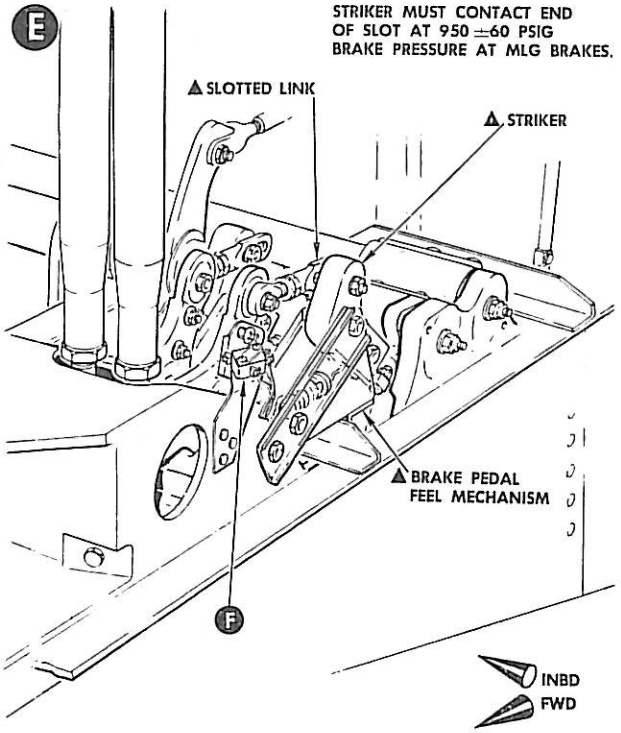


NLG FULL BRAKING CONTROL SWITCHES

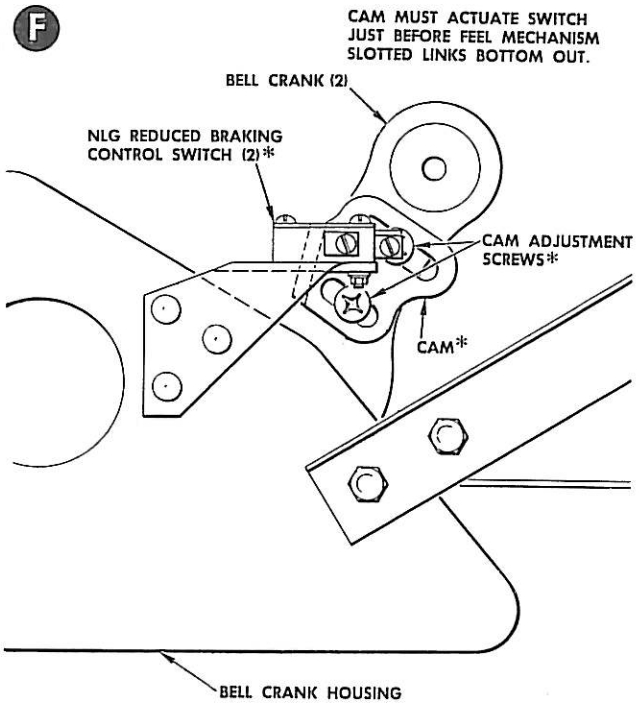


NLG FULL BRAKING SWITCH AND PEDAL STOP ADJUSTMENTS

30.02.32.078-1 B



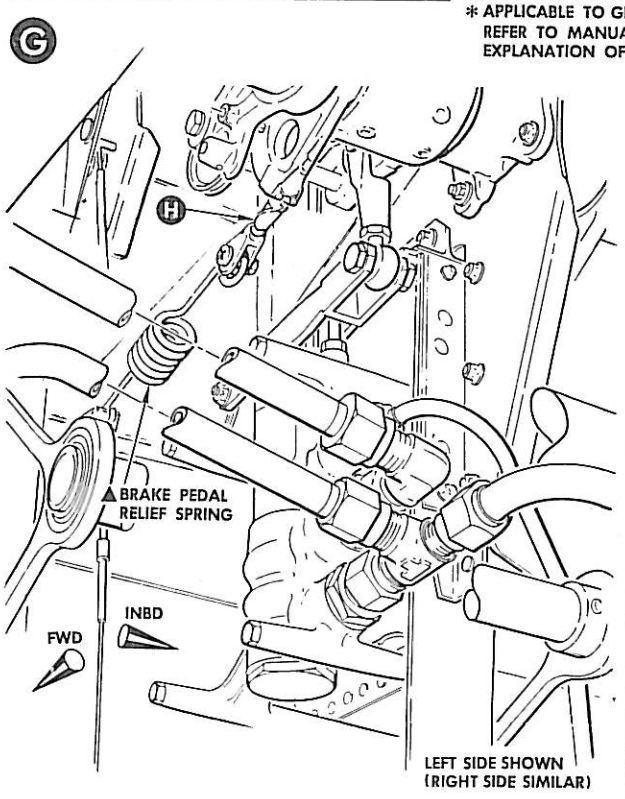
BRAKE PEDAL FEEL MECHANISM ADJUSTMENT



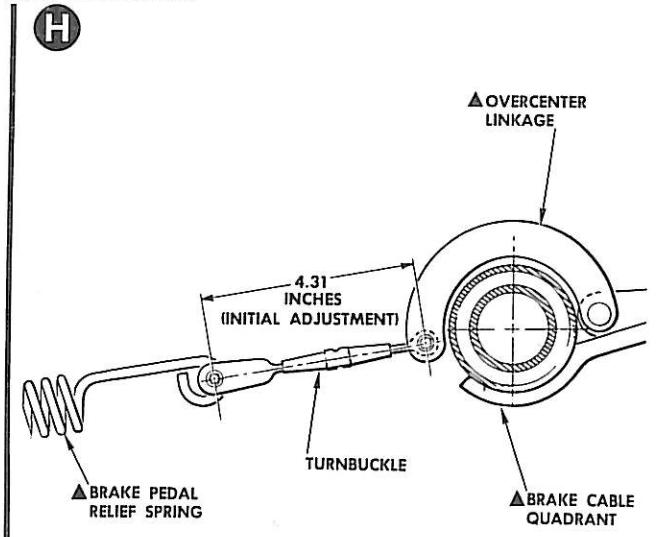
NLG REDUCED BRAKING CONTROL SWITCH ADJUSTMENT

NOTE:

▲ APPLICABLE TO ALL GROUP II AIRPLANES.
* APPLICABLE TO GROUP II AIRPLANES CV5 THROUGH CV24 REFER TO MANUAL INTRODUCTION FOR EXPLANATION OF GROUP DESIGNATIONS.



RELIEF SPRING



RELIEF SPRING ADJUSTMENT

30.02.32.078-2B

Figure Detail

(7) Make certain the parking brake handle is in the fully retracted (off) position.

(8) Set rudder pedals in neutral position with brakes released.

(9) Install hydraulic pressure test gage at a brake assembly on each landing gear.

(10) Connect external source of ac electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(11) Connect external source of hydraulic power to airplane (refer to Chapter 29, HYDRAULIC POWER). Do not apply hydraulic pressure.

C. Rigging and Adjustment Procedure.

(1) Install rigging pins 22-J107-3 (2) through the lever arms on left ends of brake torque tubes and adjacent structure. B

(2) Install rigging pins 22-J107-2 (2) through left and right brake quadrants in hydraulic compartment (sta. 972) and adjacent structure. A

(3) Adjust control rods so that the face of each brake pedal is at a 90-degree angle to the flight compartment floor. Use test tool TSTO 22-04309 or equivalent protractor to determine position of the pedals. Tighten control rod check nuts to torque value of 95 to 110 inch-pounds. B

(4) Using cable tensiometers at approximately midlength of the cables, adjust cable tension to 120 (±10) pounds at 70 degrees F. Increase tension 0.25 pound per degree F increase in ambient temperature (0.50 pound per degree C). Decrease tension 0.25 pound per degree F decrease in ambient temperature (0.50 pound per degree C).

NOTE: Turnbuckles are located at fuselage stations 209, 629, and 648.

(5) Check tension at two places on each cable; the average reading shall meet the required value.

(6) Remove tensiometers and safety turnbuckles.

	Figure Detail
(7) Adjust length of each main landing gear brake metering valve clevis rod so that the brake metering valve operating lever is against the full closed (top) stop. Connect each clevis rod to respective metering valve operating lever and tighten clevis rod check nut. NOTE: Do not change adjustment of metering valve stop bolt.	A
(8) *For Group II airplanes, adjust length of brake pedal relief spring turnbuckles to 4.31 inches (initial adjustment) between bolt centers.	G,H
(9) Remove rigging pins installed in steps (1) and (2), preceding.	A,B
(10) Install test tool TSTO 22-04309 or equivalent protractor on brake pedals to adjust brake pedal stops and NLG braking control switches.	
(11) Depress brake pedals until main gear brake metering valve operating levers are against full open (bottom) stops and accomplish the following:	
(a) Adjust pedal stops below flight compartment floor (copilot's brake pedal linkage) to contact bell cranks 1.5 (±1.0) degrees after main gear brake metering valves bottom out. Safety-wire stop bolt locknuts.	C,D
(b) Adjust NLG full braking control switches below the flight compartment floor (copilot's brake pedal linkage) to actuate 0.5 (±0.5) degree before the main gear brake metering valves bottom out. Safety-wire switch hex nuts.	C,D
(12) *For Group II airplanes, pressurize No. 2 hydraulic system (refer to Chapter 29, HYDRAULIC POWER) and accomplish the following:	

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

Figure
Detail

(a) Slowly depress brake pedals and adjust slotted links of the brake pedal feel mechanism (pilot's brake pedal linkage) to bottom out on spring-loaded strikers when 900 (±60) psig hydraulic pressure is applied to MLG brakes. Allowable difference between left and right MLG brake pressure readings at given position (point slotted links bottom out) is 80 psig maximum. — E

NOTE: Approach given position only from the "brakes off" position when making adjustments. Overrunning and returning to given position will cause incorrect adjustment.

(b) Lightly lubricate rubbing surfaces of the brake pedal feel mechanism slotted links with grease, Specification MIL-G-3278

(c) On *Group II airplanes CV5 thru CV24 only, adjust cams at NLG reduced braking control switches (pilot's brake pedal linkage) to actuate switches just before slotted links in the brake pedal feel mechanism bottom out. — F

(d) Check brake pedal forces per TABLE I or TABLE II (refer to Adjustment/Test Normal Brake System - Functional Check, step 4.C.(3) thru 4.C.(7)). If necessary, regulate pedal forces by adjusting length of brake pedal relief spring turnbuckles. Safety-wire turnbuckles following adjustment. — G,H

(13) Release brake pedals to the "brake off" position.

(14) Test system (refer to Adjustment/Test Normal Brake System - Functional Check).

2. Adjustment/Test Parking Brake Control - Functional Check

A. Equipment Required.

(1) Spring scale calibrated 0 to 20 pounds in one-pound increments.

(2) Hydraulic test unit (Skydrol 500A hydraulic fluid) capable of delivering 3000 psig.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

(3) Three hydraulic pressure test gages calibrated 0 to 2000 psig in 50-pound increments.

NOTE: Gages must be equipped with fittings to connect to brake assemblies.

(4) External source of 115/200 volt, 3-phase, 400 cps ac electrical power.

B. Preparation.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(2) Install hydraulic pressure test gage at a brake assembly on each landing gear.

(3) Connect hydraulic test unit to No. 1 and No. 2 hydraulic systems and pressurize systems (refer to Chapter 29, HYDRAULIC POWER).

(4) Connect and apply external source of ac electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(5) Check that the following circuit breakers on main circuit breaker panel are closed:

ANTI-SKID NOSE POWER, MAIN POWER, CONT, and WARN.

RH and LH LANDING GEAR GROUND SAFETY RELAYS.

(6) Actuate ANTI-SKID switch on pilot's overhead switch panel to ON position.

(7) Check that nose wheels are at neutral (±4 degrees).

(8) Check that nose wheel brakes control switch on the pilot's nose wheel steering handwheel is in the normal position (amber warning light extinguished).

C. Parking Brake Test.

(1) Check that parking brake handle is all the way in.

(2) Attach spring scale to handle grip.

(3) Depress pilot's or copilot's brake pedals to stops.

(4) Exert a steady pull on spring scale and slowly pull parking brake handle out. The force required to pull handle all the way out shall be 10 (±2) pounds.

(5) Release brake pedals; then release parking brake handle.

(a) Slot in parking brake latch shall engage lever arm pin and lock the handle (refer to 32-8-10, Figure 201).

(b) Hydraulic pressure at left and right MLG brakes shall be 900 psig minimum.

(c) *For Group I and Group II airplanes CV1 thru CV4 and CV25 and on, NLG brake pressure shall be 0 psig.

(d) *For Group II airplanes CV5 thru CV24, NLG brake pressure shall be 575 (±50) psig.

(6) Open either LANDING GEAR GROUND SAFETY RELAYS circuit breaker and check that MLG brakes remain engaged.

NOTE: If MLG brakes release, check parking brake microswitch adjustment (refer to 32-8-10, step 2.D.(2)).

(7) Close LANDING GEAR GROUND SAFETY RELAYS circuit breaker.

(8) Depress pilot's or copilot's brake pedals to stops. Parking brake latch shall disengage and parking brake handle shall release.

(9) Release brake pedals. All landing gear brakes shall release.

(10) Remove spring scale from the parking brake handle.

(11) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING) and disconnect hydraulic test unit from airplane.

(12) Disconnect external source of ac electrical power from airplane (refer to Chapter 24, ELECTRICAL POWER).

(13) Remove hydraulic pressure test gages and bleed NLG and MLG brakes (refer to Adjustment/Test Brakes - Bleeding Procedure).

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

3. Adjustment/Test Hydraulic Brake Pressure Indicator and MLG Brake Accumulator Relief Check Valve - Functional Check

A. Equipment Required.

(1) External source of 115/200 volt, 3-phase, 400 cps ac electrical power.

(2) Hydraulic test unit (Skydrol 500A hydraulic fluid) capable of delivering 3000 psig.

B. Preparation.

(1) Connect source of hydraulic power to the No. 2 hydraulic system (refer to Chapter 29, HYDRAULIC POWER). Do not pressurize system.

(2) Connect and apply external source of ac electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(3) Close (push in) HYD BRAKE PRESS circuit breaker on main circuit breaker panel.

C. Procedure.

(1) With electrical power on and no hydraulic pressure in No. 2 hydraulic system, the brake pressure indicator shall indicate 0 (±20) psig.

(2) Apply hydraulic pressure to the No. 2 hydraulic system in 1000 psi increments to 3000 psig. The brake pressure indicator shall agree with external power source gage within 120 psi.

NOTE: Allow sufficient time for hydraulic pressure to stabilize and tap indicator lightly before taking readings.

(3) Turn off external source of hydraulic power. When the external source of hydraulic pressure has reduced to 0 psig, check that brake pressure indicator indicates at least 1800 psig. If brake pressure drops below 1800 psig, the MLG brake accumulator relief-check valve is malfunctioning and must be replaced.

(4) Pump brake pedals until the brake pressure indicator drops to 0 psig.

(5) Disconnect external source of electrical power from airplane (refer to Chapter 24, ELECTRICAL POWER).

(6) Disconnect external source of hydraulic power from airplane (refer to Chapter 29, HYDRAULIC POWER).

4. Adjustment/Test Normal Brake System - Functional Check

A. Equipment Required.

(1) Two test tools TSTO 22-04309, or equivalent protractors, for measuring brake pedal travel.

(2) 1/2-inch drive torque wrench calibrated in foot-pounds (to be used with test tool TSTO 22-04309), or a suitable force measuring device, for checking brake pedal forces.

(3) Three hydraulic pressure test gages calibrated 0 to 2000 psig, minimim, in 50-pound increments.

NOTE: Gages must be equipped with fittings to connect to brake assemblies.

(4) Airplane jacking equipment.

(5) Hydraulic test unit (Skydrol 500A hydraulic fluid) capable of delivering up to 3000 psig.

(6) External source of 115/200 volt, 3-phase, 400 cps ac electrical power.

(7) Protractor for measuring nose wheel steering travel.

B. Preparation for Brake Test.

(1) Ascertain that landing gear ground safety pins are installed.

(2) Raise airplane on wing and fuselage jacks till wheels are clear of ground and rotate freely (refer to Chapter 7, LIFTING AND SHORING).

(3) Check the following:

(a) Landing gear control lever in DOWN position.

(b) Parking brake handle full in (brakes off).

(c) Rudder pedals in neutral position.

(d) Nose steering handwheel at NEUTRAL position.

(4) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

(5) Install hydraulic pressure test gage at a brake assembly on each landing gear.

(6) Check accumulators for the following pressures.

(a) Hydraulic system No. 1 and No. 2 accumulators shall read 900 (±100) psig.

(b) MLG brake system accumulator shall read 900 (±100) psig.

NOTE: The above pressure tolerances apply to airplane gages only. For correct servicing pressures, refer to Chapter 12, SERVICING.

(7) Disconnect nose landing gear torque arms.

(8) Attach protractor to nose landing gear to check brake shutoff (wheels centered) switch on steering unit.

(9) Install test tools TSTO 22-04309, or equivalent protractors, on brake pedals. Use 1/2-inch drive torque wrench with test tools TSTO 22-04309, or a suitable force measuring device to measure brake pedal forces.

(10) Actuate the left and right MLG ground safety switches to the ground-borne position by inserting wooden wedges under switch rollers.

(11) Connect and apply external source of ac power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(12) Connect hydraulic test unit to No. 1 and No. 2 hydraulic systems and pressurize systems (refer to Chapter 29, HYDRAULIC POWER).

(13) Close the following circuit breakers, on main circuit breaker panel:

HYD BRAKE PRESS.

ANTI-SKID NOSE POWER, MAIN POWER, CONT, and WARN.

RH and LH LANDING GEAR GRD SAFETY RELAYS.

(14) Actuate ANTI-SKID switch on pilots' overhead switch panel to ON position.

(15) Check that nose wheel brakes control switch on the pilot's nose wheel steering handwheel is in the normal position (amber warning light extinguished).

C. Normal Brake System Test.

(1) With parking brake and brake pedals released, check that all wheels rotate freely.

(2) HYD BRAKE PRESS indicator on copilot's instrument panel shall indicate 3000 (±100) psig.

(3) Depress pilot's left brake pedal and check brake pressure and pedal forces per TABLE I or TABLE II for left MLG. Right MLG brake pressure and NLG brake pressure shall remain at 0 psig.

NOTE: Use TABLE I when measuring brake pedal forces with test tools TSTO 22-04309 and 1/2-inch drive torque wrench. Use TABLE II when measuring brake pedal forces with a force measuring device.

(4) Release pilot's left brake pedal. Left MLG brake pressure shall return to 0 psig.

(5) Depress pilot's right brake pedal and check brake pressure and pedal forces per TABLE I or TABLE II for right MLG. Left MLG brake pressure and NLG brake pressure shall remain at 0 psig.

(6) Release pilot's right brake pedal. Right MLG brake pressure shall return to 0 psig.

(7) Applying equal force, depress pilot's left and right brake pedals and check NLG brake actuation per TABLE I or TABLE II.

NOTE: *On Group II airplanes CV5 thru CV24 only, reduced braking pressure shall be applied to the nose wheel brakes when brake pedals are depressed to the "feel step". On all airplanes, full braking pressure shall be applied to the nose wheel brakes when brake pedals are depressed to the stops.

(8) Repeat steps (3) thru (7) for copilot's position.

(9) Depress pilot's or copilot's brake pedals to stops and check that all ten wheels are locked.

CAUTION: PRIOR TO ACCOMPLISHING STEP (10), FOLLOWING, CHECK THAT NLG TORQUE ARMS ARE DISCONNECTED. STRUT CENTERING CAMS CAN BE DAMAGED IF NOSE WHEEL STEERING IS OPERATED WITH TORQUE ARMS CONNECTED AND STRUT PISTON EXTENDED.

(10) Slowly turn nose wheel steering handwheel to the left. NLG brakes shall release when nose wheel steering mechanism has traveled 7 (±0.5) degrees to the left of neutral.

(11) Slowly turn nose wheel steering handwheel to the right. NLG brakes shall lock and remain locked from 7 (±0.5) degrees left of neutral to 7 (±0.5) degrees right of neutral. NLG brakes shall release when nose wheel steering mechanism has traveled 7 (±0.5) degrees to the right of neutral position.

(12) Return nose wheel steering mechanism to neutral position.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 32-64.

Insert facing 32-8-0, Page 209, dated Jan. 25/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for Group I airplanes substitute the following table where indicated. Refer to Manual INTRODUCTION for explanation of group designations.

Retain this temporary revision in your manual until all Group I airplanes have been modified.

Delete TABLE I and replace with the following for unmodified airplanes:

TABLE I

(Applicable only when using test tools TSTO 22-04309 and torque wrench)

BRAKING CONDITION	PEDAL TRAVEL DEGREES	PEDAL FORCE FOOT-POUNDS	NLG PRESSURE PSIG AT BRAKE	MLG PRESSURE PSIG AT BRAKE
BRAKES NEUTRAL	0	0	0	0
MAIN WHEEL ACTUATION	8 (±2)	9 (±1)	–	50 - 200
MAIN WHEEL BRAKE METERING VALVES JUST BOTTOMED	24.5 (±1.5)	41 (±4)	–	1750 (±50)
NOSE WHEEL ACTUATION	ACTUAL DEGREES MAIN VALVES BOTTOM −0.5 (±0.5)	–	740 - 1000	–
BRAKE PEDALS ON STOPS	ACTUAL DEGREES MAIN VALVES BOTTOM +1.5 (±1.0)	59 (±6)	740 - 1000	1750 (±50)

TABLE I

(Applicable only when using test tools TSTO 22-04309 and torque wrench)

BRAKING CONDITION	PEDAL TRAVEL DEGREES	PEDAL FORCE FOOT-POUNDS	NLG PRESSURE PSIG AT BRAKE		MLG PRESSURE PSIG AT BRAKE
			Airplanes CV1 thru CV4, CV25 and on	Airplanes CV5 thru CV24 only	
BRAKES NEUTRAL	0	0	0	0	0
MAIN WHEEL ACTUATION	8 (±2)	8 (±1)	—	—	50 - 200
MAIN WHEEL BRAKE METERING VALVES JUST BOTTOMED	23 (±1.5)	38 (±4)	—	—	1750 (±50)
NOSE WHEEL FULL ACTUATION	ACTUAL DEGREES MAIN VALVES BOTTOM -0.5 (±0.5)	—	740 - 1000	900 (±160)	—
BRAKE PEDALS ON STOPS	ACTUAL DEGREES MAIN VALVES BOTTOM +1.5 (±1.0)	47 (±5)	740 - 1000	900 (±160)	1750 (±50)
WET RUNWAY "FEEL STEP"	PEDAL TRAVEL REQUIRED TO JUST CONTACT FEEL MECHANISM	—	—	400 (±40)	800 (±80)*

*Difference between left and right MLG brake pressures shall not exceed 80 psi.

TABLE II

(Applicable when using a force scale or other suitable measuring device)

BRAKING CONDITION	PEDAL TRAVEL DEGREES	*PEDAL FORCE POUNDS	NLG PRESSURE PSIG AT BRAKE		MLG PRESSURE PSIG AT BRAKE
			Airplanes CV1 thru CV4, CV25 and on	Airplanes CV5 thru CV24 only	
BRAKES NEUTRAL	0	0	0	0	0
MAIN WHEEL ACTUATION	8 (±2)	24	—	—	50 - 200
MAIN WHEEL BRAKE METERING VALVES JUST BOTTOMED	23 (±1.5)	119	—	—	1750 (±50)
NOSE WHEEL FULL ACTUATION	ACTUAL DEGREES MAIN VALVES BOTTOM -0.5 (±0.5)	—	740 - 1000	900 (±160)	—
BRAKE PEDALS ON STOPS	ACTUAL DEGREES MAIN VALVES BOTTOM +1.5 (±1.0)	144	740 - 1000	900 (±160)	1750 (±50)
WET RUNWAY "FEEL STEP"	PEDAL TRAVEL REQUIRED TO JUST CONTACT FEEL MECHANISM	—	—	400 (±40)	800 (±80)**

*Apply force, normal to pedal, five inches from pedal pivot point.
**Difference between left and right MLG brake pressures shall not exceed 80 psi.

CONVAIR MODEL 30

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 32-65.

Insert facing 32-8-0, Page 210, dated Jan. 25/63 (or subsequent). This temporary revision supersedes Temporary Revision No. 32-51, dated Sep. 17/62. In addition, remove Temporary Revision No. 32-52, dated Sep. 17/62, facing 32-8-0, Page 210.
The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for Group I airplanes substitute the following table where indicated. Refer to Manual INTRODUCTION for explanation of group designations.

Retain this temporary revision in your manual until all Group I airplanes have been modified.

Delete TABLE II and replace with the following for unmodified airplanes:

TABLE II

(Applicable when using a force scale or other suitable measuring device)

BRAKING CONDITION	PEDAL TRAVEL DEGREES	*PEDAL FORCE POUNDS (±10%)	NLG PRESSURE PSIG AT BRAKE	MLG PRESSURE PSIG AT BRAKE
BRAKES NEUTRAL	0	0	0	0
MAIN WHEEL ACTUATION	8 (±2)	24	-	50 - 200
MAIN WHEEL BRAKE METERING VALVES JUST BOTTOMED	24.5 (±1.5)	123	-	1750 (±50)
NOSE WHEEL ACTUATION	ACTUAL DEGREES MAIN VALVES BOTTOM -0.5 (±0.5)	-	740 - 1000	-
BRAKE PEDALS ON STOPS	ACTUAL DEGREES MAIN VALVES BOTTOM +1.5 (±1.0)	177	740 - 1000	1750 (±50)

* Apply force, normal to pedal, five inches from pedal pivot point.

(13) Actuate nose wheel brakes control switch on pilot's nose wheel steering handwheel to off position.

(a) Nose wheel brakes shall disengage.

(b) Amber light on nose wheel steering handwheel shall illuminate.

(14) Actuate ANTI-SKID control switch on overhead switch panel to OFF position. Amber light on nose wheel steering handwheel shall extinguish.

(15) Return ANTI-SKID control switch to ON position. Amber light on nose wheel steering handwheel shall illuminate.

(16) Return nose wheel brakes switch on pilot's nose wheel steering handwheel to normal position. Amber light on steering handwheel shall extinguish and nose wheel brakes shall engage.

(17) Release brake pedals. All ten wheels shall rotate freely.

D. Conclusion.

(1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING) and disconnect hydraulic test unit from airplane.

(2) Disconnect external source of ac power from airplane (refer to Chapter 24, ELECTRICAL POWER).

(3) Reconnect nose landing gear torque arms.

(4) Return left and right MLG ground safety switches to the airborne position by removing wooden wedges from under switch roller.

(5) Remove test equipment and restore airplane to normal configuration.

(6) Lower airplane and remove jacks (refer to Chapter 7, LIFTING AND SHORING).

(7) Bleed nose and main landing gear brake systems (refer to Adjustment/Test Brakes - Bleeding Procedure).

5. Adjustment/Test Antiskid System - Functional Check

A. Equipment Required.

(1) Hydraulic power unit (Skydrol 500A hydraulic fluid) capable of delivering 3000 psig.

(2) Antiskid system test unit TSTO 30-05408, or equivalent, to rotate skid detectors (transducers) and measure rpm at which skid detectors are rotated.

NOTE: Test unit TSTO 30-05408 contains a test NLG skid detector which is to be used in place of the airplane NLG skid detector. The test NLG skid detector facilitates functional check procedure in that airplane NLG skid detector need not be removed. The airplane MLG skid detectors are used when checking the main gear antiskid system.

(3) Source of 115/200 volt, 3-phase, 400 cps ac electrical power.

B. Preparation.

(1) Remove hub caps from MLG wheels (refer to 32-8-8).

(2) Disconnect electrical harness from NLG skid detector if antiskid system test unit TSTO 30-05408 is used. Otherwise remove NLG skid detector (refer to 32-8-8) and leave electrical harness connected.

(3) Connect antiskid system test unit TSTO 30-05408 (if used) to airplane, per instructions furnished with unit. Check that test unit GROUND SAFETY switch is in AIRBORNE position and REGULATED B+ switch is in OFF position.

(4) Connect external source of hydraulic power and pressurize airplane hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(5) Connect and apply external source of ac power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(6) Check that left and right landing gear ground safety switches are in the groundborne position.

(7) Check that all landing gear down-lock switches are in the locked position.

(8) Place nose wheel brakes control switch on pilot's nose wheel steering handwheel in normal position (amber warning light extinguished).

(9) Check that nose wheels are at neutral (±4 degrees).

(10) Check that nose landing gear stowed switch is in unlocked position.

(11) Actuate ANTI-SKID switch on pilots' overhead switch panel to ON position.

(12) Close the ANTI-SKID NOSE POWER, MAIN POWER, CONT, and WARN circuit breakers, on main circuit breaker panel. Open RH and LH LANDING GEAR GRD SAFETY RELAYS circuit breaker.

C. Nose Wheel Arming and Skid Checks.

(1) Check that RH and LH LANDING GEAR GRD SAFETY RELAYS circuit breakers are open.

(2) Actuate and secure NLG full braking control switches (located on copilot's brake pedal linkage below the flight compartment floor). Nose wheel brakes shall engage.

NOTE: Brake engagement is indicated by extending of the braking pistons against braking discs. *On Group II airplanes CV5 thru CV24, the nose wheel brakes shall also engage when the reduced braking control switches (located on pilot's brake pedal linkage below flight compartment floor) are actuated in place of the full braking control switches.

(3) Release NLG right-hand full braking control switch. Nose wheel brakes shall disengage.

(4) Reactuate NLG right-hand full braking control switch. Nose wheel brakes shall engage.

(5) Repeat steps (3) and (4) for NLG left-hand full braking control switch.

(6) Actuate nose wheel brakes control switch on pilot's nose wheel steering handwheel to off position.

(a) Nose wheel brakes shall disengage.

(b) Amber light on pilot's nose wheel steering handwheel shall illuminate.

(c) NOSE WHEEL INOP light on overhead switch panel shall illuminate.

(7) Return nose wheel brakes control switch on pilot's steering handwheel to normal position.

(a) Nose wheel brakes shall engage.

(b) Warning lights in step (6)(b) and (6)(c) preceding, shall extinguish.

(8) Using test unit TSTO 30-05408, or equivalent, rotate NLG skid detector (transducer) at 1500 (±150) rpm. Suddenly stop detector rotation.

(a) Nose wheel brakes shall remain engaged when skid detector is rotated.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

(b) Nose wheel brakes shall momentarily disengage when skid detector rotation is suddenly stopped, then reengage.

(9) Release NLG full braking control switches to their normal, unactuated, position. Nose wheel brakes shall disengage.

D. MLG Skid Checks.

(1) Close RH and LH LANDING GEAR GRD SAFETY RELAYS circuit breakers. If antiskid system test unit TSTO 30-05408 is used, actuate test unit GROUND SAFETY switch to GROUND position.

(2) Depress brake pedals against stops, and hold. NLG and MLG brakes shall engage.

(3) Using test unit TSTO 30-05408, or equivalent, rotate each MLG skid detector (transducer) at 1500 (±150) rpm. Suddenly stop detector rotation.

(a) Each MLG brake shall remain engaged as its skid detector is rotated.

(b) Each MLG brake shall momentarily disengage when its skid detector rotation is suddenly stopped, then reengage.

(c) Remaining MLG brakes (those brakes for which skid detectors are not being rotated) and NLG brakes shall disengage.

E. Fail Safe Test Circuit Check.

NOTE: Antiskid system test unit TSTO 30-05408 must be used to check fail safe test circuit.

(1) Open RH and LH LANDING GEAR GRD SAFETY RELAYS circuit breakers.

(2) Actuate ANTI-SKID switch on pilots' overhead switch panel to OFF position. NOSE WHEEL INOP and MAIN WHEEL INOP warning lights on overhead switch panel shall illuminate.

(3) Actuate antiskid system test unit TSTO 30-05408 GROUND SAFETY switch to GROUND position.

(4) Actuate ANTI-SKID switch on overhead switch panel to ON position. NOSE WHEEL INOP and MAIN WHEEL INOP lights shall extinguish.

(5) Depress and hold ANTI-SKID TEST switch on overhead switch panel. NOSE WHEEL INOP and MAIN WHEEL INOP lights shall illuminate.

(6) Release ANTI-SKID TEST switch. NOSE WHEEL INOP and MAIN WHEEL INOP lights shall extinguish.

(7) Actuate GROUND SAFETY switch on antiskid system test unit TSTO 30-05408 to AIRBORNE position.

(8) Actuate and hold ANTI-SKID TEST switch on pilots' overhead switch panel. NOSE WHEEL INOP and MAIN WHEEL INOP lights shall illuminate.

(9) Release ANTI-SKID TEST switch. NOSE WHEEL INOP and MAIN WHEEL INOP lights shall remain illuminated.

(10) Actuate GROUND SAFETY switch on antiskid system test unit TSTO 30-05408 to GROUND position. NOSE WHEEL INOP and MAIN WHEEL INOP lights shall extinguish.

F. Locked Wheel Checks.

(1) If antiskid system test unit TSTO 30-05408 is used, check that test unit GROUND SAFETY switch is in GROUND position.

(2) Open RH and LH LANDING GEAR GRD SAFETY RELAYS circuit breakers.

(a) All MLG brakes shall disengage.

(b) NLG brakes shall remain engaged.

(3) Actuate ANTI-SKID switch on overhead switch panel to OFF position.

(a) All MLG brakes shall engage.

(b) NLG brakes shall disengage.

(c) NOSE WHEEL INOP and MAIN WHEEL INOP lights on overhead switch panel shall illuminate.

(4) Actuate ANTI-SKID switch to ON position.

(a) All MLG brakes shall disengage.

(b) NLG brakes shall engage.

(c) NOSE WHEEL INOP and MAIN WHEEL INOP lights shall extinguish.

(5) Close RH LANDING GEAR GRD SAFETY RELAYS circuit breaker. MLG brakes shall engage.

(6) Open RH LANDING GEAR GRD SAFETY RELAYS circuit breaker. MLG brakes shall disengage.

(7) Repeat steps (5) and (6) for LH LANDING GEAR GRD SAFETY RELAYS circuit breaker.

(8) Pull out parking brake handle and set parking brake.

(9) Secure NLG full braking switches (copilot's brake pedal linkage) in actuated position.

(10) Using test unit (TSTO 30-05408, or equivalent, smoothly rotate any MLG skid detector (transducer) at 1500 (±150) rpm, then suddenly stop detector rotation. All brakes shall remain engaged throughout rotation and sudden stopping of MLG skid detector.

(11) Release NLG full braking switches to their normal unactuated position.

(a) *For Group I and Group II airplanes CV1 thru CV4 and CV25 and on, NLG brakes shall disengage.

(b) *For Group II airplanes CV5 thru CV24, NLG brakes shall remain engaged.

(12) Release parking brake (momentarily depress and release brake pedals).

(a) MLG brakes shall disengage.

(b) *For Group II airplanes CV5 thru CV24, NLG brakes shall disengage.

G. In Flight Braking - NLG.

(1) Open LANDING GEAR POS & WARN circuit breaker on main circuit breaker panel.

(2) Disconnect electrical plug from NLG down-lock up-lock switch and place jumper wire between pins G and H.

(3) Close LANDING GEAR POS & WARN circuit breaker. Nose wheel brakes shall engage.

(4) Open LANDING GEAR POS & WARN circuit breaker. Nose wheel brakes shall disengage.

(5) Remove jumper wire from NLG down-lock up-lock switch plug and reconnect plug to switch.

H. Conclusion.

(1) Deleted.

(2) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING) and disconnect hydraulic test unit from airplane.

(3) Disconnect external source of ac power from airplane (refer to Chapter 24, ELECTRICAL POWER).

(4) Disconnect antiskid system test unit TSTO 30-05408 (is used) from airplane.

(5) Install NLG skid detector (if removed) (refer to 32-8-8) and connect electrical harness.

*Refer to Manual INTRODUCTION for Explanation of Group Designations.

(6) Install hub caps on MLG wheels (refer to 32-8-8).

(7) Close all circuit breakers opened for test.

6. Adjustment/Test Brakes - Bleeding Procedure

A. Equipment Required.

(1) Suitable container to hold hydraulic fluid bled from brakes.

(2) Bleeder hose.

B. Preparation.

NOTE: When bleeding the NLG brakes, steps B.(2) through B.(5) must be accomplished before hydraulic pressure can reach the NLG brakes. Accomplishment of these steps is not necessary to bleed MLG brakes.

(1) (Deleted.)

(2) Close ANTI-SKID NOSE POWER circuit breaker on main circuit breaker panel.

(3) Actuate ANTI-SKID switch on the pilots' overhead switch panel to ON position.

(4) Check that pilot's nose wheel steering handwheel is at NEUTRAL and NLG brakes control switch is in normal position (amber warning light extinguished.

(5) Energize 28-volt dc essential bus (refer to Chapter 24, ELECTRICAL POWER).

C. Bleed Brakes.

(1) Pressurize hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(2) Connect bleeder hose to bleed valve on brake to be bled.

(3) Place a suitable container beneath brake to be bled.

(4) Slowly pump and then depress brake pedals, and hold.

NOTE: Brake pedals must be fully depressed against stops to bleed NLG brakes.

(5) Slowly loosen bleed valves and allow hydraulic fluid to escape until fluid is free of air bubbles; retighten bleed valve and release brakes.

CAUTION: DO NOT ALLOW HYDRAULIC FLUID TO CONTACT TIRES.

(6) Repeat steps (4) and (5) until brake is free of air. Remove bleeder hose.

(7) Repeat steps (2) through (6) at each brake until all brakes are free of air.

(8) Reduce hydraulic pressure to 0 psig and check hydraulic reservoir fluid quantity (refer to Chapter 12, SERVICING).

(9) (Deleted.)

7. Adjustment/Test Brakes - Maintenance Procedures Following Abnormal Operations

NOTE: The following information is a guide to ensure safety of personnel.

A. Equipment Required. Fire extinguishing equipment.

B. Procedure To Be Followed After a "Hot" Landing.

(1) Check that parking brake has not been set.

WARNING: DO NOT APPROACH WHEEL AREAS OF AIRPLANE FOR AT LEAST 30 MINUTES AFTER LANDING, AND THEN APPROACH WHEELS ONLY FROM THE FRONT OR REAR. TIRES MAY EXPLODE FROM OVERHEATING.

(2) After allowing sufficient time for brakes to cool, visually check the brakes, wheels, and tires. Check for seal leakage and tire damage.

(3) Actuate brakes fully five times, and during final application, check for hydraulic leaks.

(4) Check brakes for proper running clearances and allowable wear (refer to 32-8-6).

C. Procedure To Be Followed After a Rejected Takeoff.

(1) Check that parking brake has not been set.

WARNING: DO NOT APPROACH WHEEL AREAS OF AIRPLANE FOR AT LEAST 30 MINUTES FOLLOWING REJECTED TAKEOFF, AND THEN APPROACH WHEELS ONLY FROM THE FRONT OR REAR. TIRES ARE LIKELY TO EXPLODE FROM OVERHEATING.

(2) A hydraulic fluid or tire fire is possible at any time within 30 minutes. Be alert for hydraulic fluid, grease, or tire fire. A dry type chemical extinguisher is preferred, but fog or foam types are acceptable.

(3) Fog or foam may be used for cooling, otherwise two or three hours are required for brakes to cool enough for safe removal. If one or more tires remain inflated after the 30 minute time period, approach the wheel cautiously from the front or rear only. Avoid spraying fire extinguisher or coolant directly on inflated tire or wheel.

(4) Replace tires, wheels, and brakes that have been sprayed with extinguisher or coolant.

MAIN LANDING GEAR (MLG) BRAKE ACCUMULATOR - MAINTENANCE PRACTICES

1. Servicing MLG Brake Accumulator (refer to Chapter 12, SERVICING)

2. Removal/Installation MLG Brake Accumulator (see Figure 201)

   A. Equipment Required - None.

   B. Materials Required. Bubble fluid, Specification MIL-L-25567.

   C. Preparation.

      (1) Reduce hydraulic pressure to 0 psig (refer to Chapter 12, SERVICING).

      (2) Open and attach warning tag to the HYD PUMP MOTOR CONT circuit breaker, on main circuit breaker panel.

   D. Remove MLG Brake Accumulator.

      (1) Gain access to the MLG brake accumulator through the hydraulic compartment door. Accumulator is just forward of the door.

      (2) Relieve air pressure from the MLG brake accumulator by removing valve cap and slowly loosening filler valve hex nut counterclockwise.

      WARNING: WHEN REMOVING VALVE CAP OR OPENING VALVE, HOLD VALVE BODY FIRMLY WITH WRENCH. A LOOSENED VALVE BODY COULD BE BLOWN OUT BY INTERNAL PRESSURE AND CAUSE SERIOUS INJURY OR FATALITY TO PERSONNEL.

      (3) Remove filler valve and gage assembly from lower end of MLG brake accumulator.

      (4) Disconnect hydraulic pressure line from upper end of MLG brake accumulator.

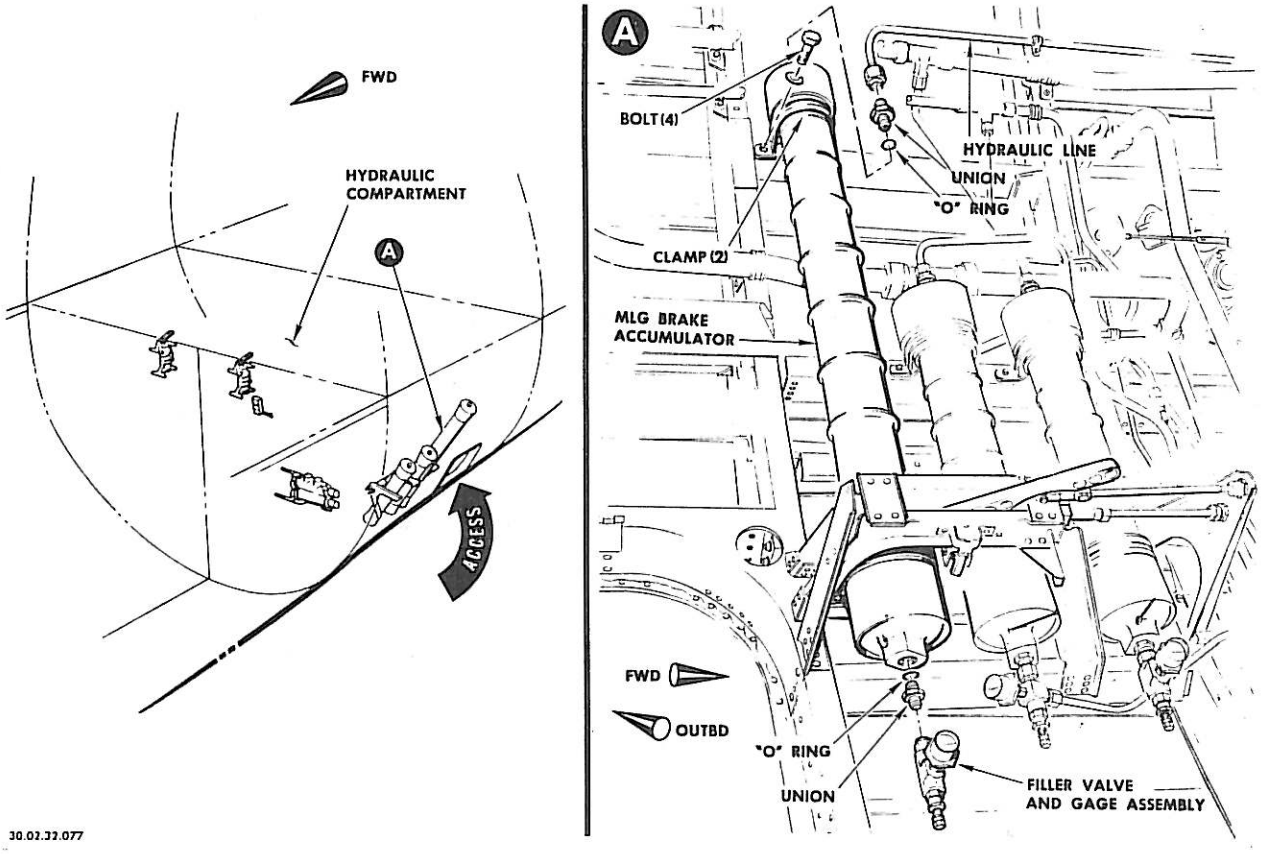
      (5) Remove four bolts and washers securing accumulator retaining clamps; remove MLG brake accumulator and retaining clamps.

      NOTE: Remove fitting in each end of accumulator and hold for installation on replacement accumulator; discard "O" rings.

   E. Install MLG Brake Accumulator.

      (1) Install fitting in each end of accumulator. Use new "O" rings for installation. ("O" rings must be soaked in Skydrol 500A hydraulic fluid prior to installation.)

      (2) Place accumulator on mounting bracket with the AIR END down.



Main Landing Gear Brake Accumulator Installation
Figure 201